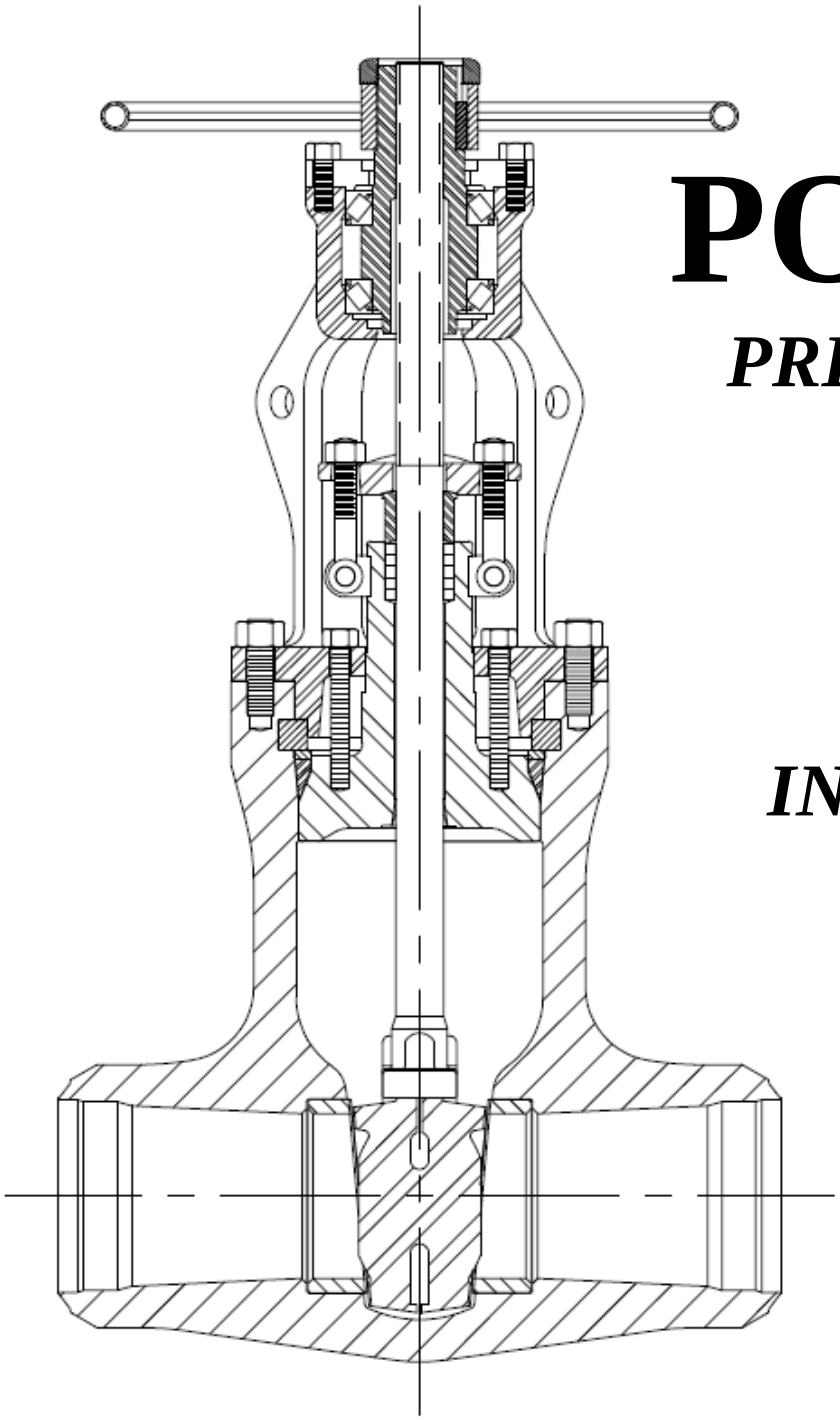

POWELL

PRESSURE SEAL VALVES

INSTRUCTION MANUAL

MANUAL
NUMBER
69-1

THE WM. POWELL COMPANY
2503 SPRING GROVE AVENUE
CINCINNATI, OHIO 45214

Powell Pressure Seal Valves are built to high standards of precision and accuracy and must pass rigid inspection before leaving the factory. It is imperative that the valves be properly installed, maintained and operated to assure satisfactory performance.

The purpose of this service manual is to instruct installation crews, maintenance foremen and operating personnel in these fundamentals. This manual should be kept available to these presonnel at all times so that they may become familiar with the details of these valves.

Powell Pressure Seal Valves are intended for high pressure, high temperature services of all fluids where severe coking is not a factor. They are guaranteed to be in good condition; however, we assume no responsibility for damage to valves due to faulty installation, improper operation or other conditions beyond our control.

THIS BOOK IS REGISTERED IN THE NAME OF:

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SERIAL NO. _____

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INSTALLATION

When your valves arrive you will find an envelope containing a PACKING LIST – an itemized statement of all valves and parts included in the shipment. The Receiving Clerk should check and account for each item on the list. Keep this PACKING LIST as a part of the permanent records of these valves.

UNLOADING of valves should be done with care. Remember that although a valve is a rugged piece of equipment it may still be damaged by abusive handling. Skidded valves should not be removed from skids until immediately before installation. LIFTING LUGS incorporated on the yokearm of many Pressure Seal Valves greatly facilitate handling.

IMPROPER INSTALLATION of a valve can have very serious consequences resulting in possible malfunction which may necessitate extensive and costly repairs. Compliance with the following recommendations will do much to assure satisfactory performance of the valve after installation.

1) CLEANING of fluid passage seating surfaces of all valves should be accomplished before installation.

2) Provisions should be made for SUPPORTING THE VALVES and adjacent piping so that pipe line stresses will not be transmitted to the valve bodies.

3) WELDING and stress relieving should conform to the A.S.M.E. Boiler Code. Valve stems should be opened slightly during preheat, welding and post heating operations.

4) CLEANING OF THE PIPE LINES in which valves are installed and all connecting lines is essential before the unit is put in operation. Welding beads, scale and foreign matter in the lines cause damage to the valve seats resulting in leakage.

5) INSULATION should not be applied to the valve above the knockout holes.

OPERATION AND MAINTENANCE

1) PACKING LEAKS should be corrected promptly by tightening the packing gland nuts. Failure to do this may result in damaged packing and inability to stop the leak until new packing is installed.

2) Powell Pressure Seal Valves have a BACK SEAT on the stem, which seats against a stellited guide in the bonnet when the valve is fully opened. This seat will hold pressure if both surfaces are clean; however, this is difficult to determine, and consequently, packing a valve under pressure is hazardous and not recommended.

3) LUBRICATION of the stem bushing is required periodically. This is accomplished by grease fitting on the side of the bushing housing. Lubricant should be added until it starts to extrude around the stem threads. Mobil Grease Type AA No. 2 or equal is recommended.

4) SPECIAL TOOLS are available for the general maintenance of Powell Pressure Seal Valves.

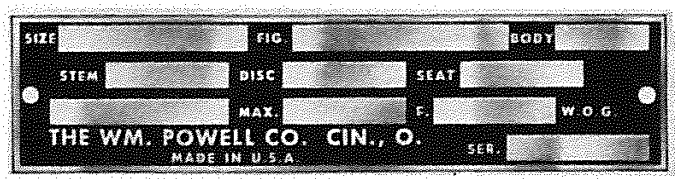
   a) Torque Wrench
   b) Laps for pressure seal joint
   c) Grinder for pressure seal body seat
   d) Tools for repairing valve sealing surfaces

5) REPLACEMENT PARTS are seldom necessary when a Powell Pressure Seal Valve is properly installed and maintained. However, it is wise to stock packing for each valve. If a valve be disassembled for any reason a new gasket should be installed.

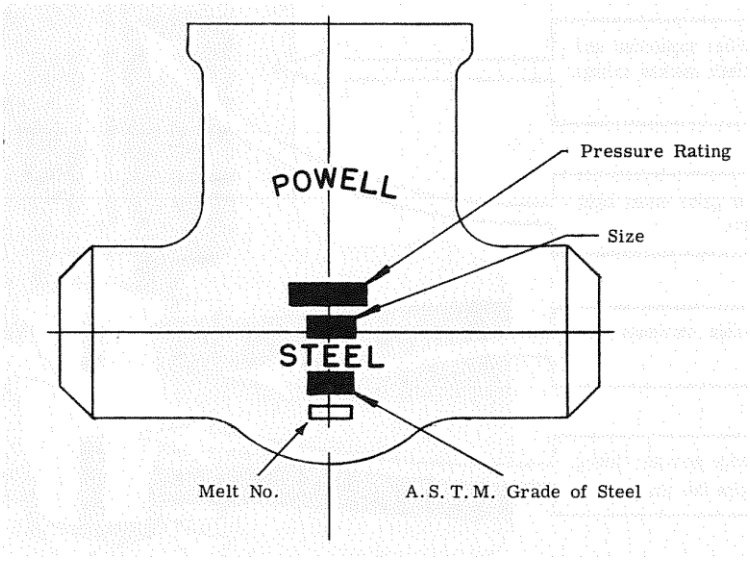
VALVE IDENTIFICATION AND REFERENCE

1) A NAMEPLATE is located on the yokearm of all pressure seal Gate and Globe Valves, and on neck of body on all Check Valves.

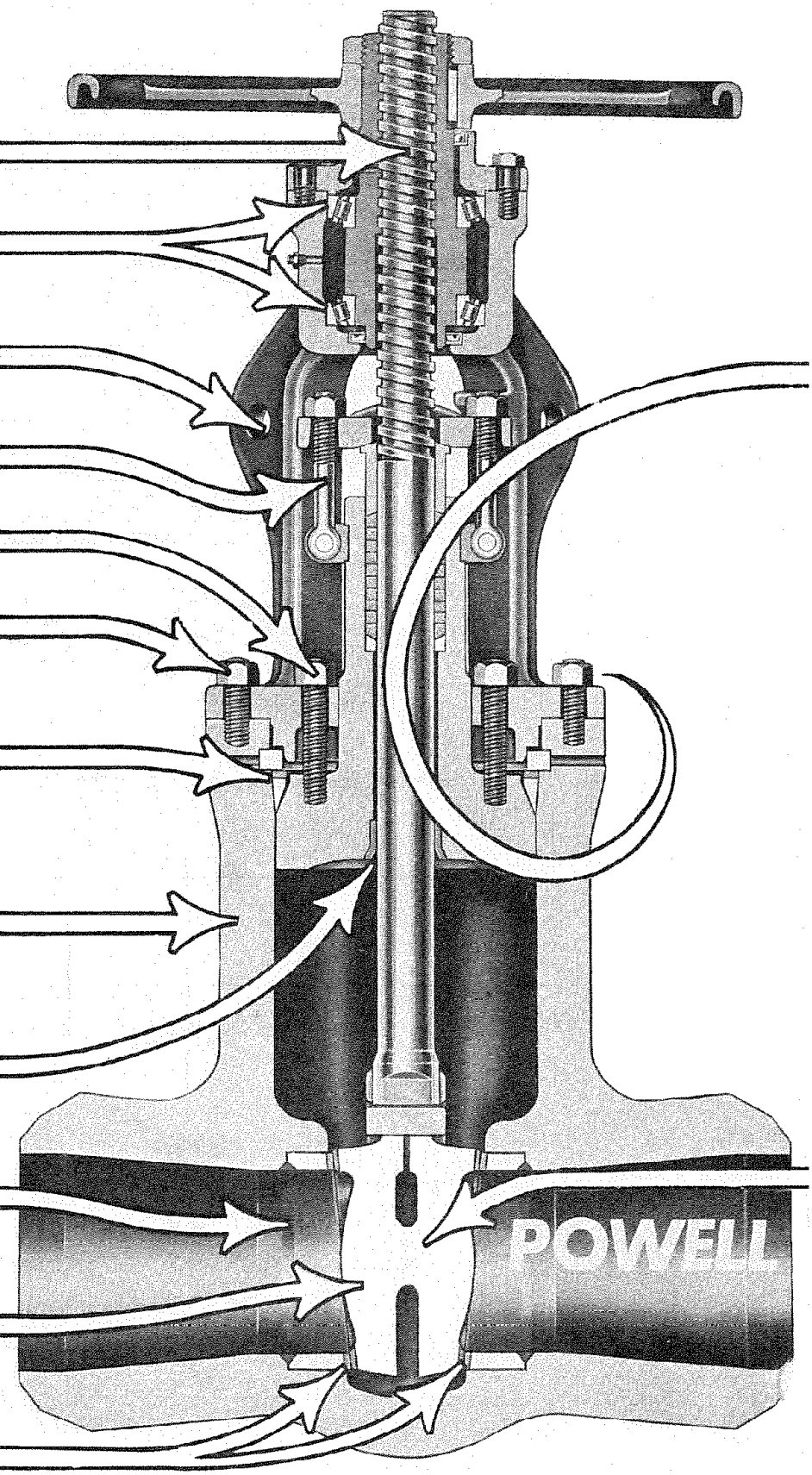
2) When ORDERING REPAIR PARTS or REFERRING TO A VALVE for any reason whatsoever, reference should always be made to the serial number located at the bottom right-hand corner of the nameplate. In addition, size and figure number also located on the nameplate should be included.



3) The lettering side of the body has the following information:



POWELL Cast Steel



Accurately machined Acme threads prolong the life of the stem and bushing.

Tapered roller bearings for ease of operation.

Lifting lugs facilitate handling the valve during erection and maintenance. Also provides means for supporting the weight of the valve.

Swing eyebolts and gland shelves facilitate repacking.

Inner row of studs establish the initial seal of the Pressure Seal Joint.

Outer row of studs secures the yokearm to the body.

The bonnet joint remains tight under all operating conditions as the sealing pressure is always many times greater than the pressure of the fluid in the line, thereby eliminating leakage. The higher the internal pressure, the greater the sealing pressure.

Streamline contour of body simplifies application and reduces cost of insulation, and effects marked savings in space and weight.

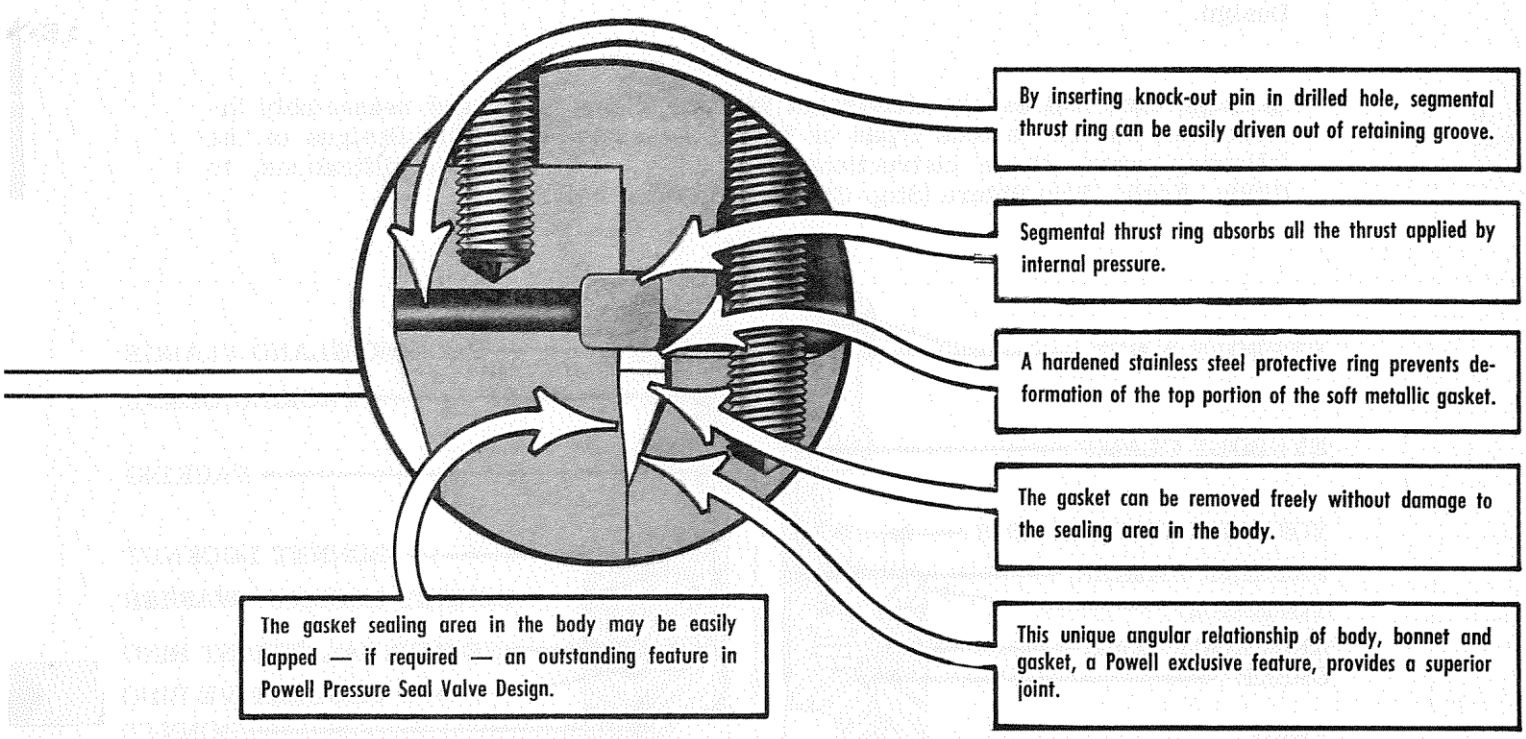
Stellite faced back seat and stem guide insure tight sealing and accurate guiding of stem.

Streamlined passage makes possible maximum flow with minimum turbulence.

Stellite faced flexible "H" type wedge prevents sticking due to temperature changes and pipe line stresses.

Seat rings are Stellite faced and securely welded in place.

Pressure Seal Valves



By inserting knock-out pin in drilled hole, segmental thrust ring can be easily driven out of retaining groove.

Segmental thrust ring absorbs all the thrust applied by internal pressure.

A hardened stainless steel protective ring prevents deformation of the top portion of the soft metallic gasket.

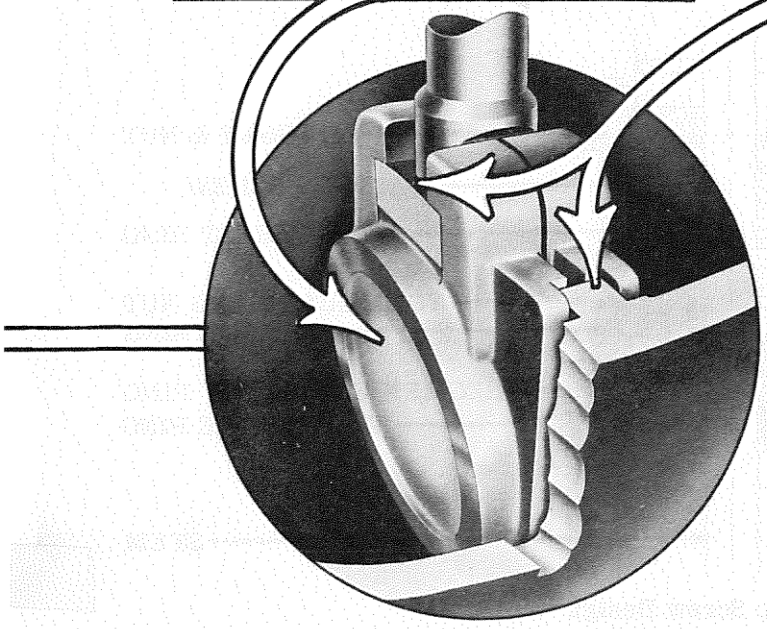
The gasket can be removed freely without damage to the sealing area in the body.

This unique angular relationship of body, bonnet and gasket, a Powell exclusive feature, provides a superior joint.

The gasket sealing area in the body may be easily lapped — if required — an outstanding feature in Powell Pressure Seal Valve Design.

One piece flexible wedge with weld deposited stellite facings insures pressure tightness, prevents wedge from sticking and reduces operating torque needed to open valve. It also offers less resistance to unseating due to temperature changes.

Body Guides provide minimum wearing of seating surfaces. Tee Head connection with close clearances provides maximum control and reduced vibration. Design of Tee Head prevents side strain on stem.



All Powell Pressure Seal Valves are kerosene tested before shipment.

POWELL CAST STEELS

POWELL Pressure Seal Valves can be furnished in any of the following Standard Alloy Cast Steels:

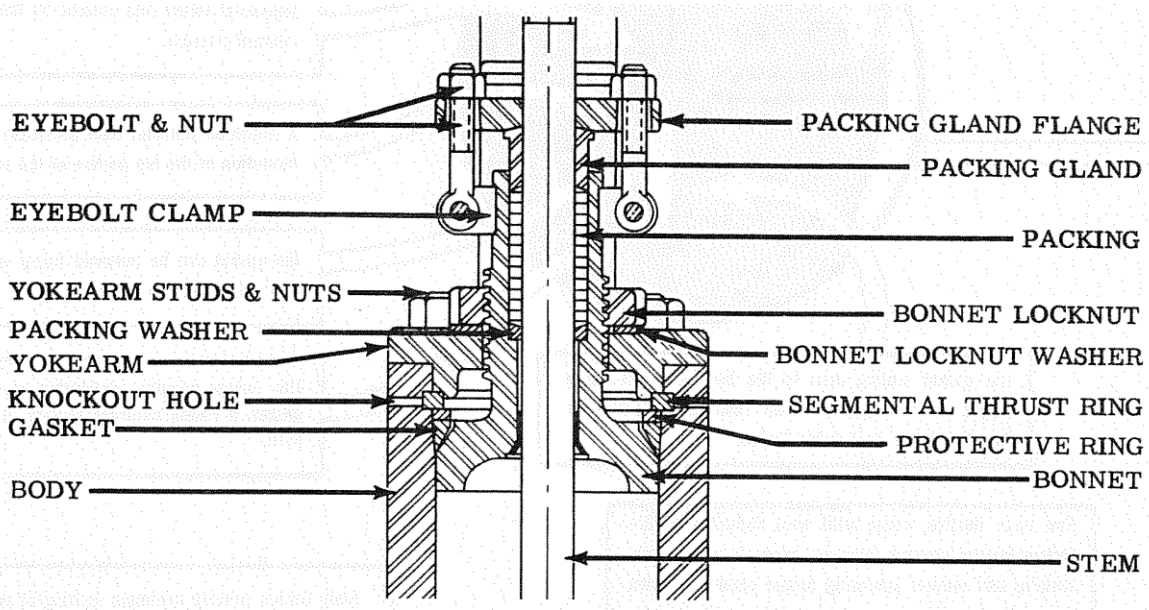
Cast Carbon Steel - - - - - -	A.S.T.M. Specification A216 Grade WCB (Powell P-200)
Cast Chromium-Molybdenum Steel -	A.S.T.M. Specification A217 Grade WC6 (Powell P-211-3)
Cast Chromium-Molybdenum Steel -	A.S.T.M. Specification A217 Grade WC9 (Powell P-416)
Cast Chromium-Nickel Steel - -	A.S.T.M. Specification A351 Grade CF8 (Powell P-172)
Cast Chromium Molybdenum-Nickel Steel - -	A.S.T.M. Specification A351 Grade CF8M (Powell P-174)

Valves can also be furnished in Special Alloy Cast Steels for special services — where ultra high temperatures and other unusual conditions are encountered.

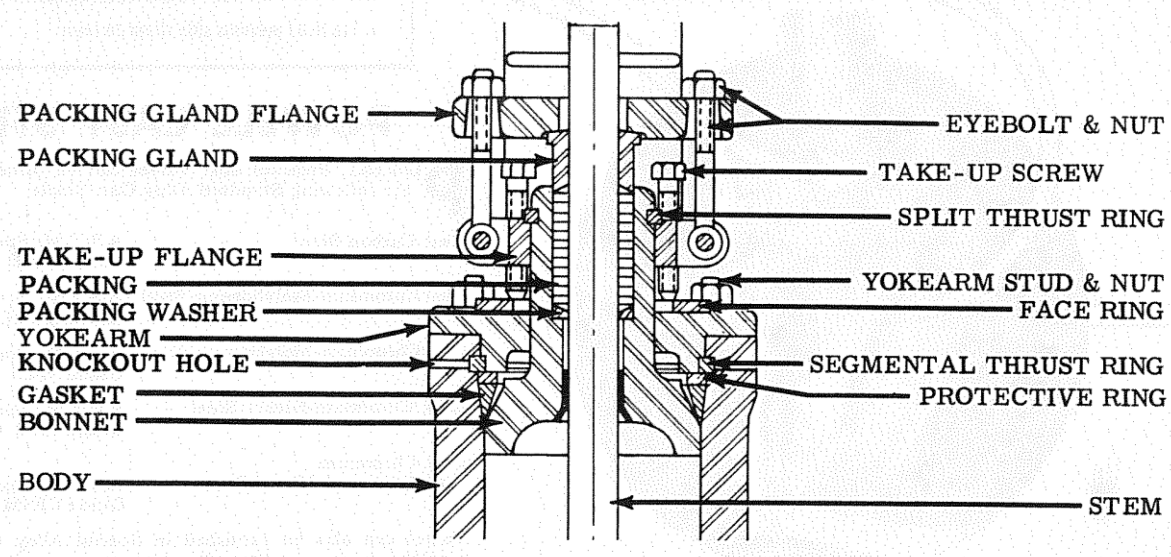
DISASSEMBLY AND REASSEMBLY OF THE PRESSURE SEAL JOINT

Disassembly and reassembly of the Pressure Seal Joint is simple if directions are followed. Powell Pressure Seal Valves utilize four types of design (1) Bonnet Locknut Design, (2) Bonnet Take-Up Screw Design (Bolted Yokearm Style), (3) Bonnet Take-up Screw Design (Threaded Yokearm Style), and (4) Bonnet Stud Design.

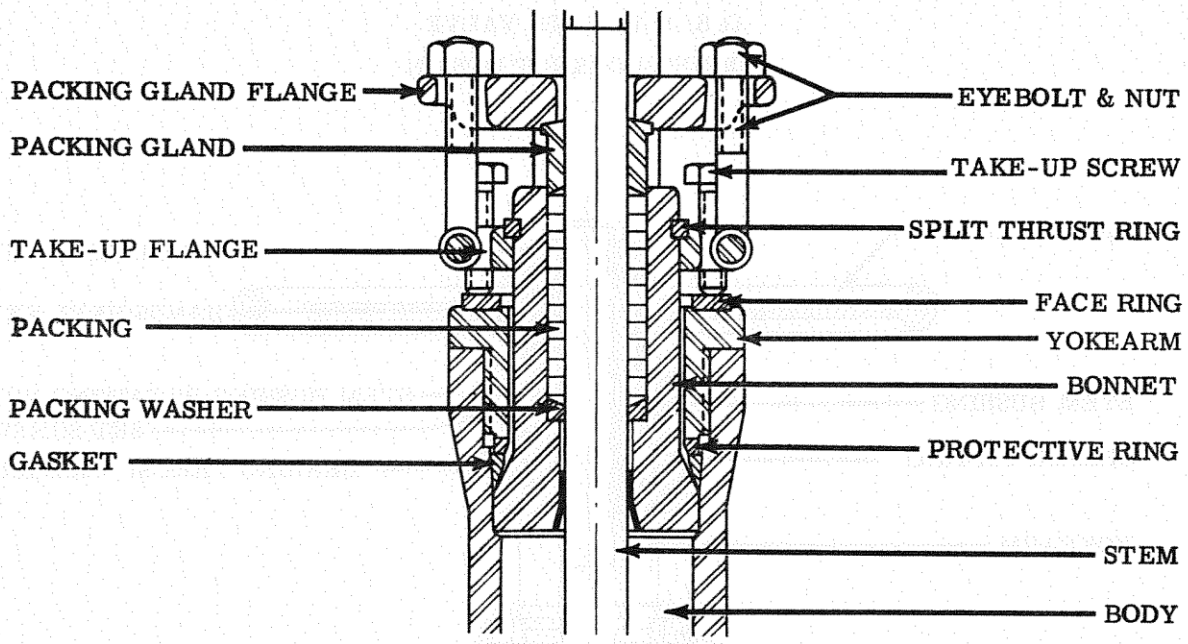
Although Gate Valves are illustrated with the disassembly and reassembly instructions for the various types of Powell Pressure Seal Joint Designs on the following pages, these instructions also apply, with minor modifications, to Globe, Angle, Non-Return (Stop-Check) and Check Valves.



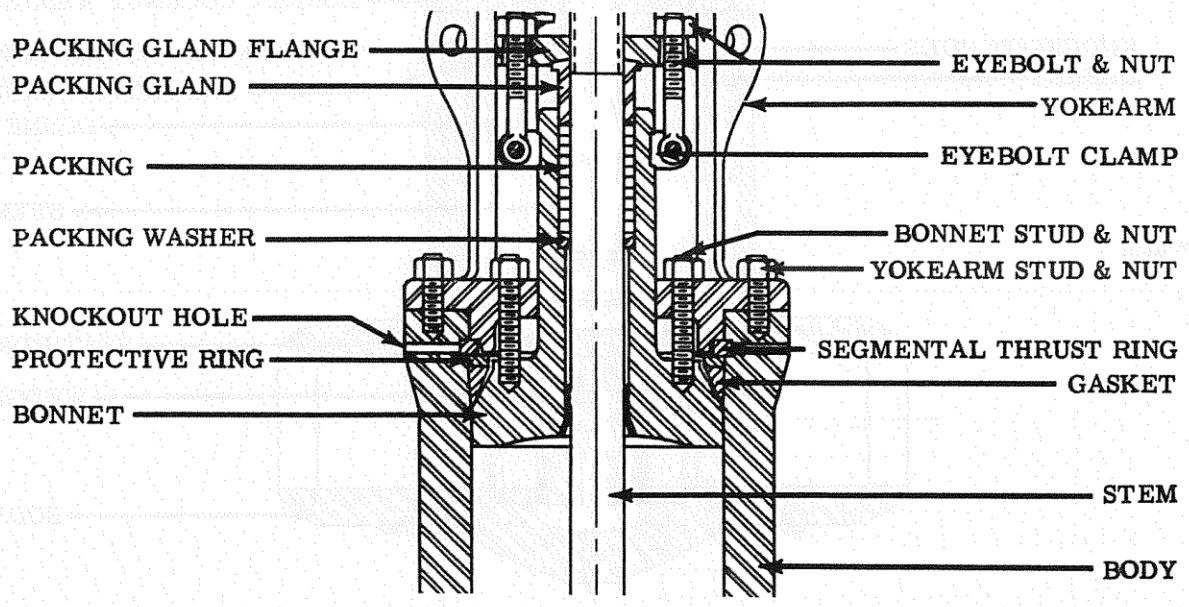
Bonnet Locknut Design



Bonnet Take-Up Screw Design
(Bolted Yokearm Style)

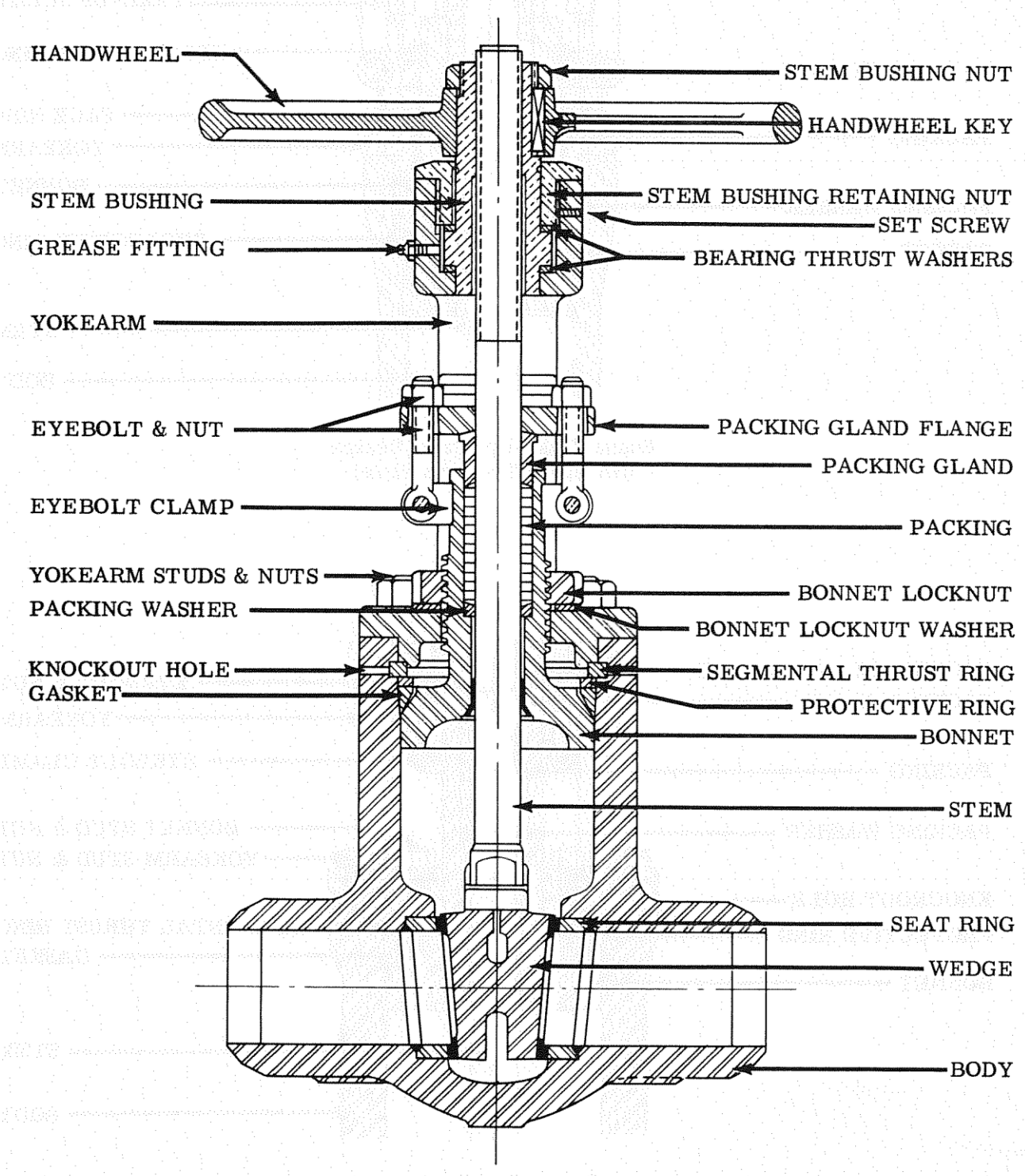


Bonnet Take-Up Screw Design
(Threaded Yokearm Style)



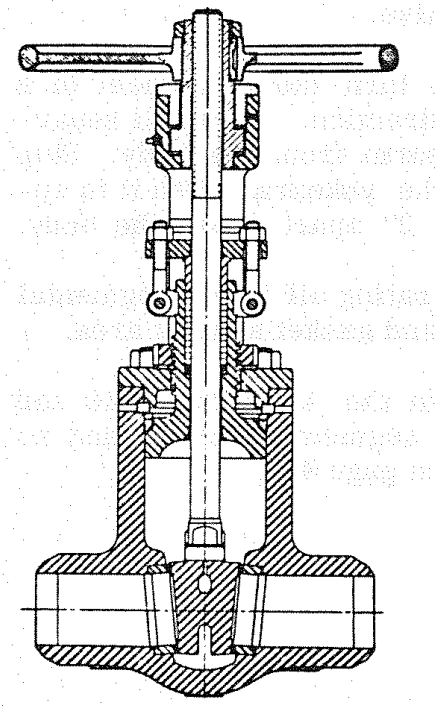
Bonnet Stud Design

O.S. & Y. GATE VALVE
BONNET LOCKNUT DESIGN



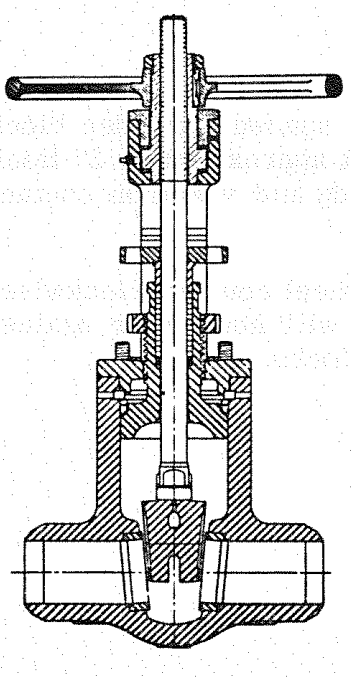
DISASSEMBLY

BONNET LOCKNUT DESIGN



1. a) Make sure there is no pressure in the valve.

   b) A sling should be provided for removing the yokearm and upper assembly.



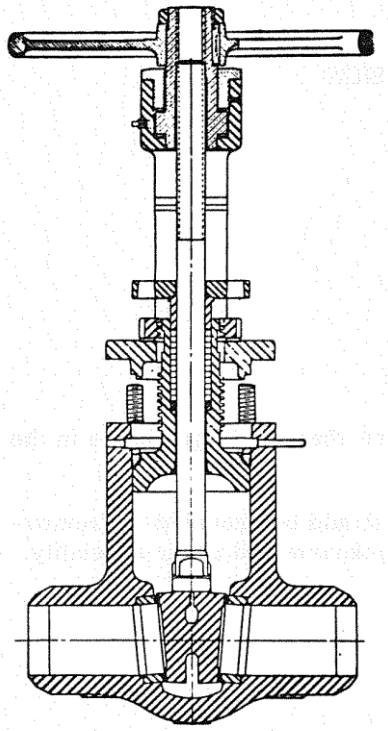
2. a) Place the valve in the half-open position. This relieves any pressure trapped in the bonnet chamber.

   b) Remove eyebolt nuts and eyebolt bolt nuts. Remove eyebolt bolts, eyebolts and eyebolt clamp.

   c) Remove the yokearm nuts.

   d) Completely loosen bonnet locknut

   e) Tap the bonnet until it slides into the body and frees the segmental thrust ring.

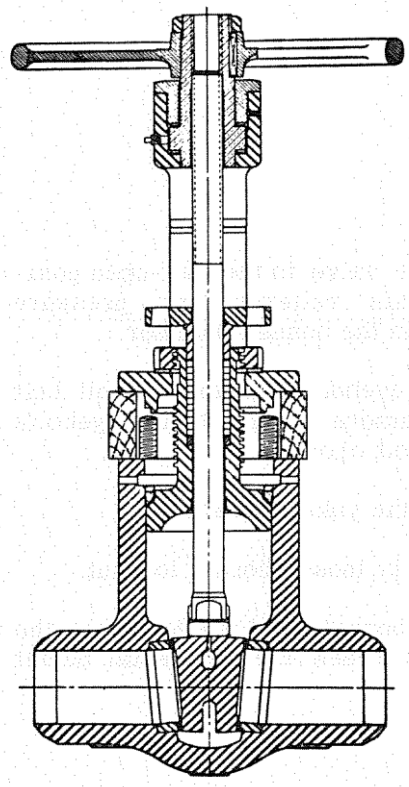


3. a) Close the valve.

   b) Continue to turn the handwheel in a clockwise direction. This will separate the yokearm from the body. Stop separating the yokearm when it is approximately 2” apart from the body.

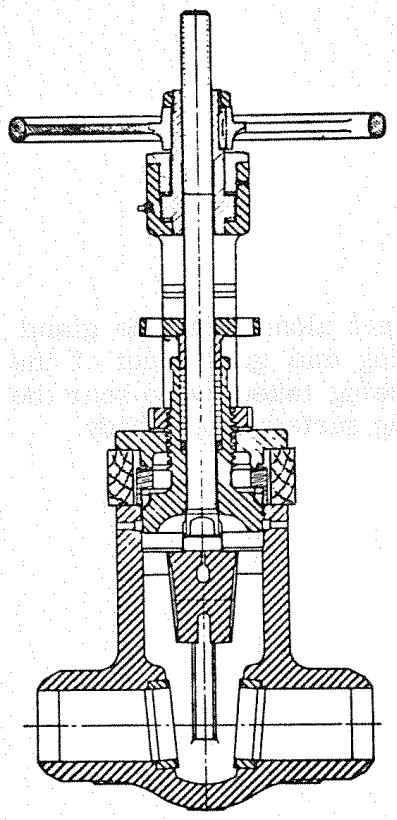
   c) Apply penetrating oil to the segmental thrust ring and gasket seating area.

   d) Insert pin in the knockout hole and remove the segmental thrust ring as illustrated on page 42.

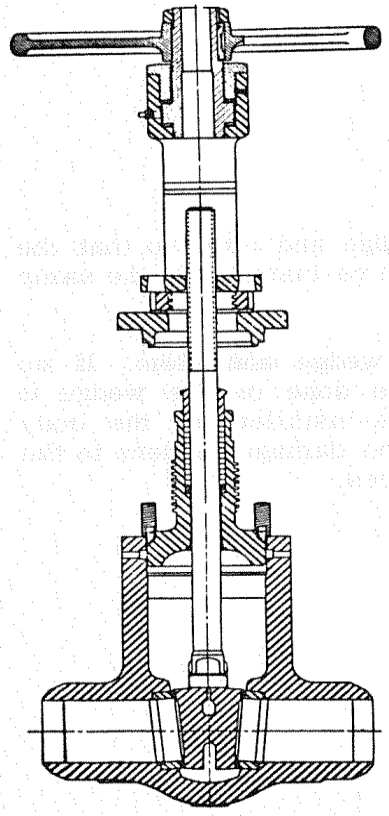


4. a) Insert equally spaced spreader block of equal height approximately 2” thick between the body and yokearm contact surfaces.

   b) Turn the handwheel counter-clockwise. The yokearm will now lower against the spreader blocks.



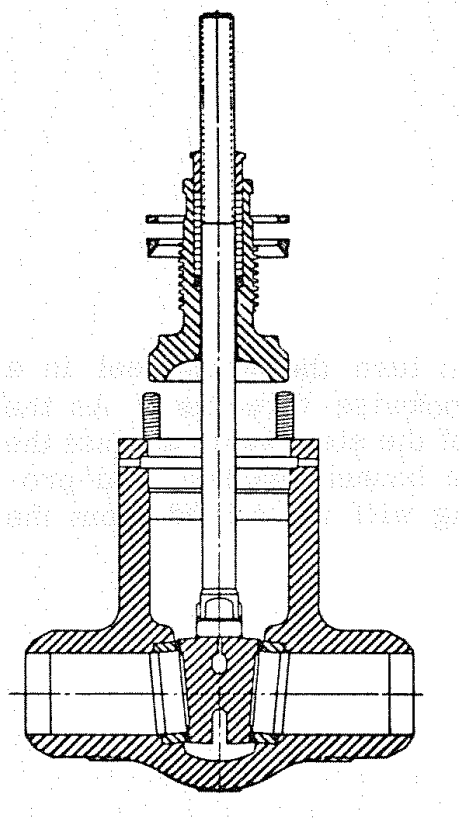
5. a) Continue to turn the handwheel in a counter-clockwise direction. As the back seat of the stem seats against the bonnet, the bonnet, gasket, and protective ring will be raised from the body.



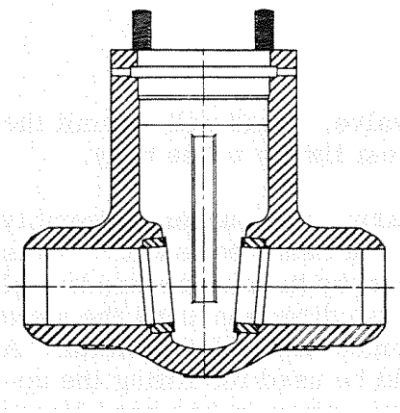
6. a) Close the valve. This will permit the bonnet to rest lightly in the body.

   b) The yokearm and upper assembly should now be removed intact.* This may be done by turning the handwheel in a clockwise direction until the stem bushing comes free of the stem. A sling should be used for lifting the upper assembly after it has been freed. The packing gland flange, bonnet locknut and bonnet locknut washer are removed during this operation as they clear the top of the stem.

* For other types of Upper Assemblies such as Bevel Gear etc. see pages 43, 44, 45, and 46.



7. a) Lift the bonnet along with the gland, protective ring and gasket out of the body, care being taken not to scar the gasket seating surface of the body.

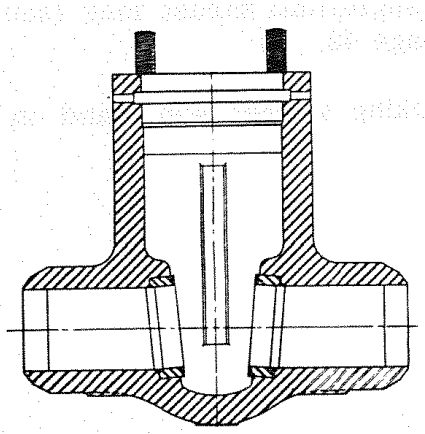


8. a) Mark the wedge and body so that the wedge may be re-installed in the same orientation.

   b) Remove the wedge and stem. If no work is to be done on the wedge it should be re-installed in the body carefully so no damage is done to the seating surfaces.

REASSEMBLY

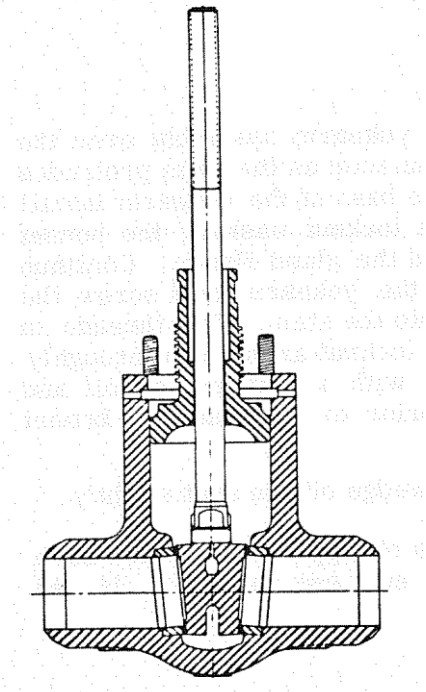
BONNET LOCKNUT DESIGN



1. a) The gasket seating surfaces of the bonnet and body should be lapped and free of any scars. See pages 48 and 49.

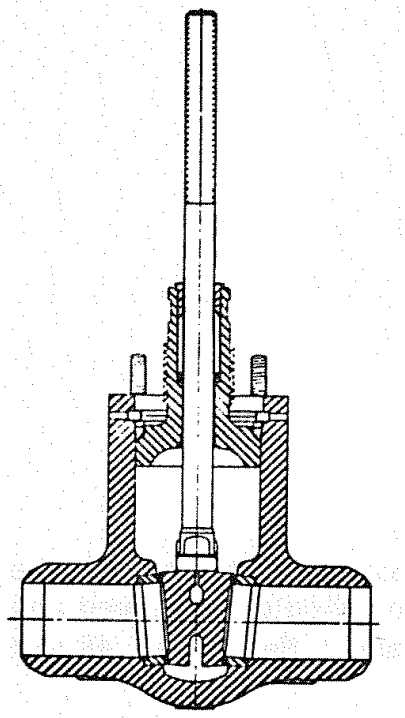
   b) Seat Ring and wedge seating surfaces should be inspected and repaired if necessary. See pages 50 and 51 for instructions for repairing gate valve seats, pages 52 through 56 for instructions for repairing globe and angle type valve seats.

   c) Clean the body and bonnet seating surfaces.



2. a) Put the wedge and stem in place, making sure the wedge has the same orientation as when disassembled.

   b) Insert the bonnet into the body.

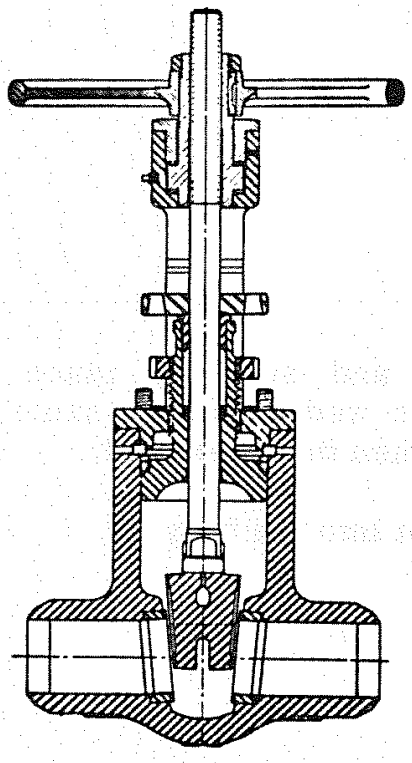


3. a) Put a new gasket in place, making sure all surfaces are clean. (It is essential to install a new gasket whenever the pressure seal joint is broken.) (See page 47 for special instructions.)

   b) Protective ring is oversize and must be machined or ground to fit valve.

   c) Insert the segmental thrust ring (see sketch on page 42).

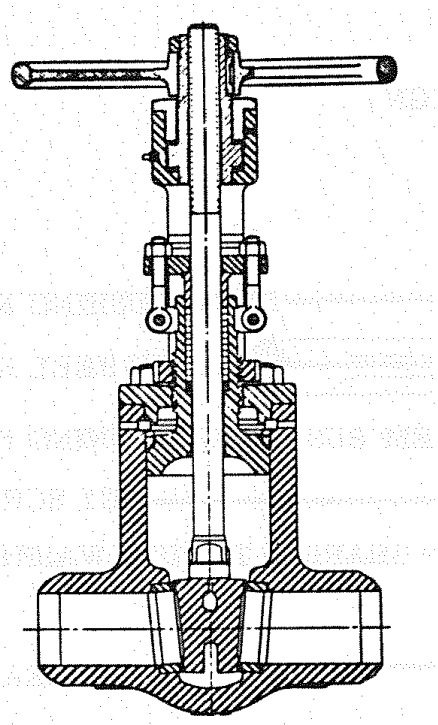
   d) Put the packing washer and gland on the stem.



4. a) Place the yokearm assembly over the stem.* As soon as the stem protrudes through the base of the yokearm install the bonnet locknut washer, the bonnet locknut and the gland flange. Continue to lower the yokearm and screw the bushing onto the stem. The threads in the bonnet locknut are to be thoroughly lubricated with a mixture of oil and graphite prior to the installation of bonnet locknut.

   b) Raise the wedge off the seat slightly.

* For other types of Upper Assemblies such as Bevel Gear etc. see pages 43, 44, 45, and 46.



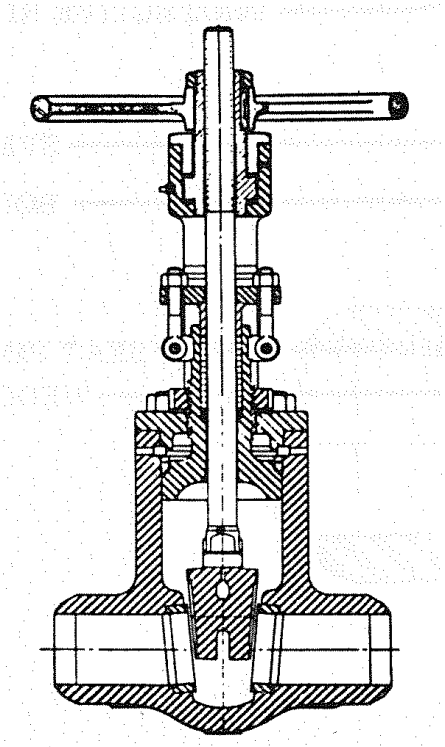
5. a) Install eyebolt clamp and eyebolts.

   b) Install and tighten nuts on the yokearm studs.

   c) Close valve.

   d) Install packing with the cut in the packing rings staggered.

   e) Install and tighten nuts on eyebolts.

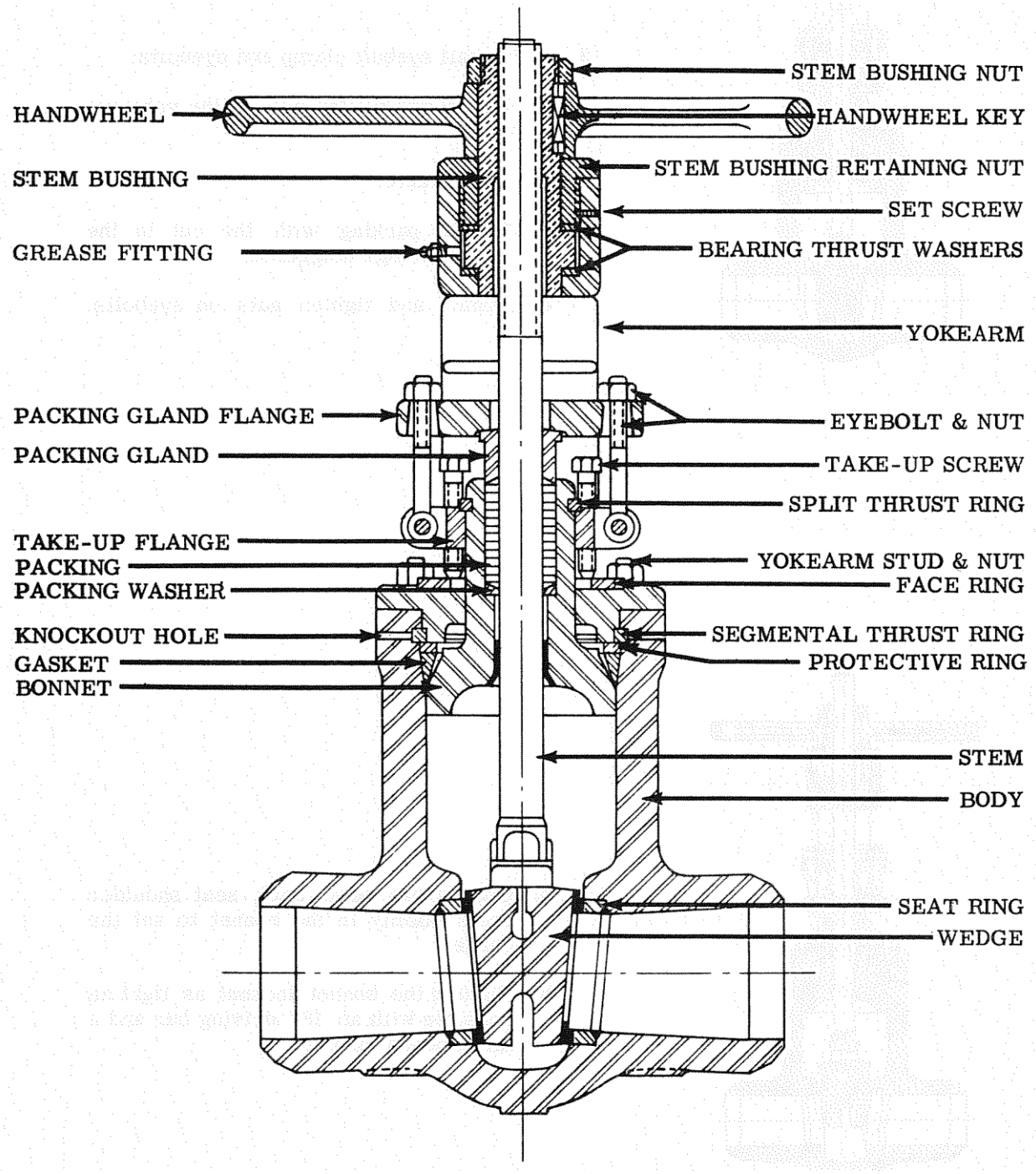


6. a) Open valve until back seat shoulder seats solidly in the bonnet to set the gasket.

   b) Tighten the bonnet locknut as tight as possible with an 18” driving bar and a three pound hammer.

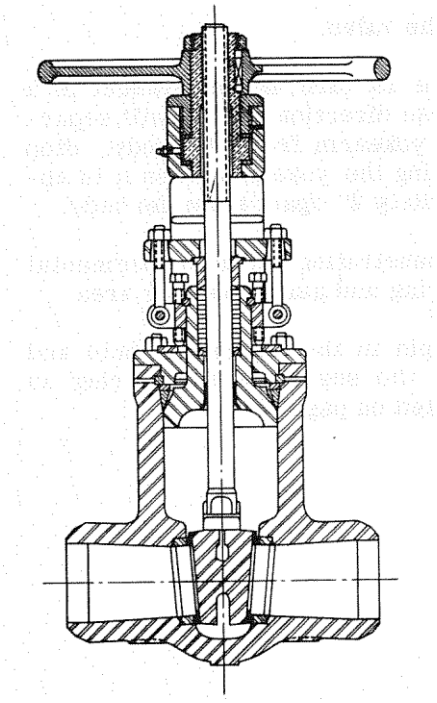
O.S.Y. GATE VALVE

BONNET TAKE-UP SCREW DESIGN
(BOLTED YOKEARM STYLE)



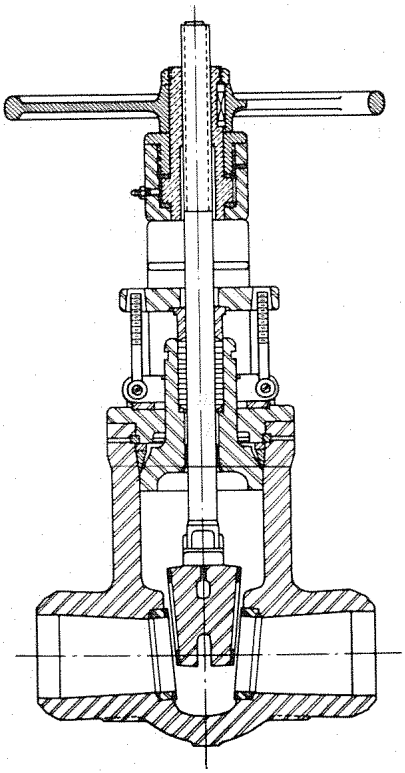
DISASSEMBLY

BONNET TAKE-UP SCREW DESIGN
(BOLTED YOKEARM STYLE)



1. a) Make sure there is no pressure in the valve.

   b) A sling should be provided for removing the yokearm and upper assembly.



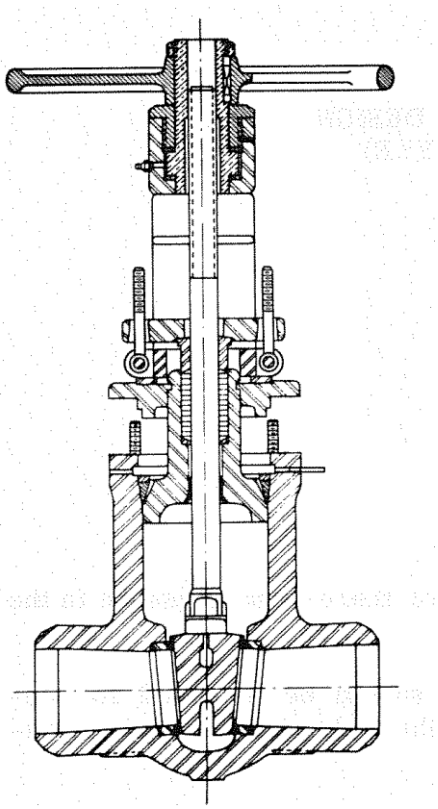
2. a) Place the valve in the half-open position. This relieves any pressure trapped in the bonnet chamber.

   b) Remove nuts from the eyebolts.

   c) Remove the yokearm nuts.

   d) Remove the take-up screws and split thrust ring.

   e) Tap the bonnet until it slides into the body and frees the segmental thrust ring.

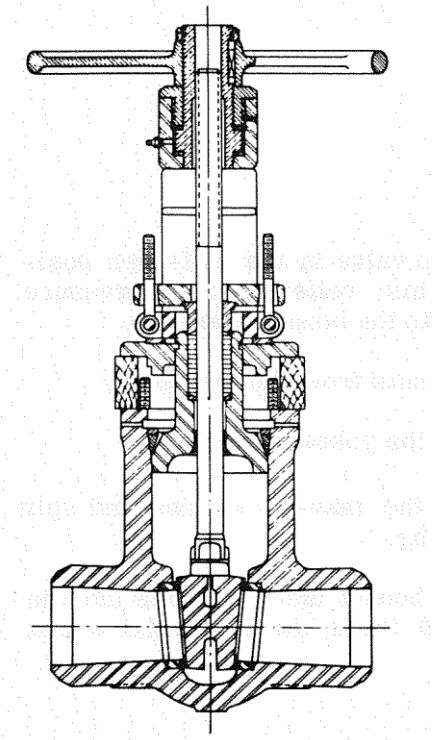


3. a) Close the valve.

   b) Continue to turn the handwheel in a clockwise direction. This will separate the yokearm from the body. Stop separating the yokearm when it is approximately 2" apart from the body.

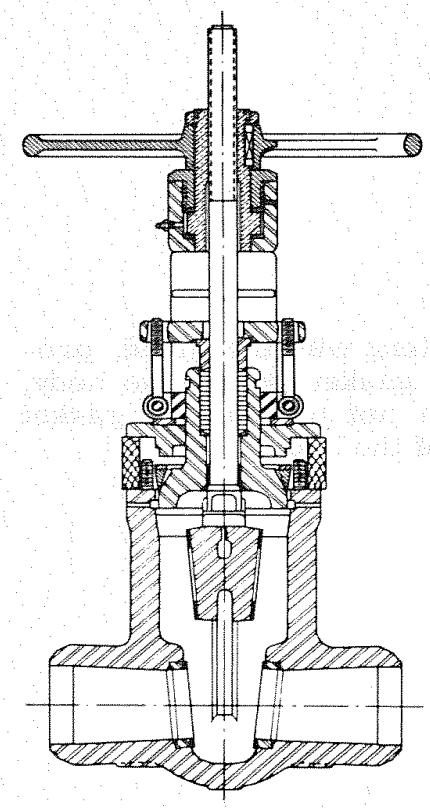
   c) Apply penetrating oil to the segmental thrust ring and gasket seating area.

   d) Insert pin in the knockout hole and remove the segmental thrust ring as illustrated on page 42.

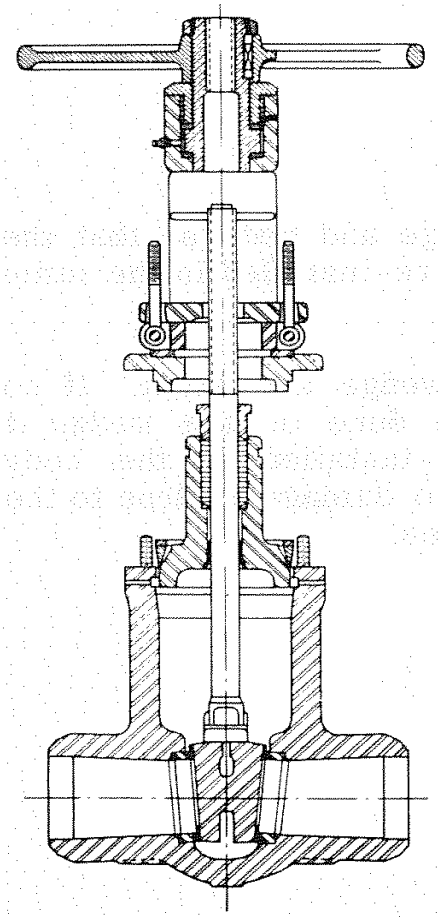


4. a) Insert equally spaced spreader block of equal height approximately 2" thick between the body and yokearm contact surfaces.

   b) Turn the handwheel counterclockwise. The yokearm will now lower against the spreader blocks.



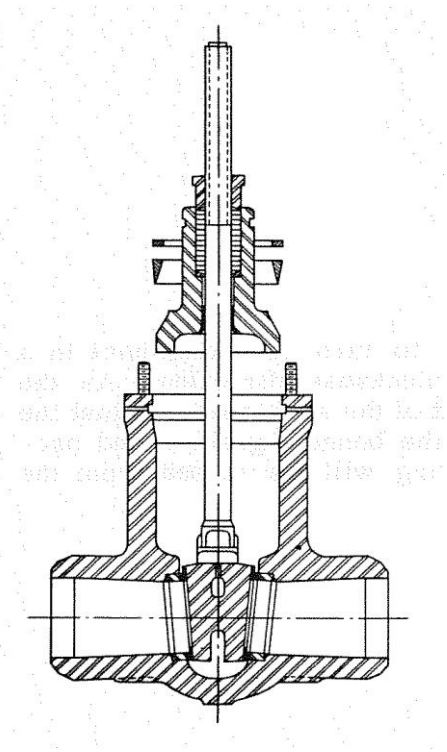
5. a) Continue to turn the handwheel in a counterclockwise direction. As the back seat of the stem seats against the bonnet, the bonnet, gasket, and protective ring will be raised from the body.



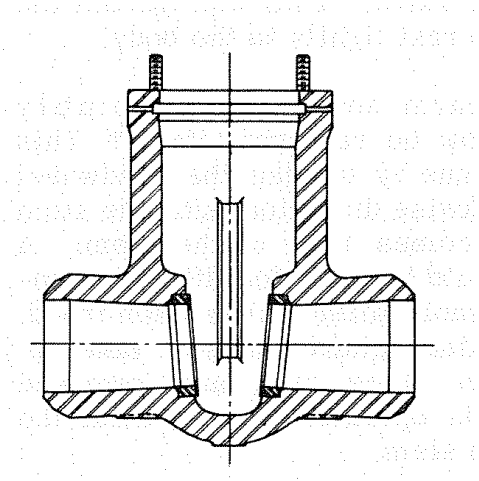
6. a) Close the valve. This will permit the bonnet to rest lightly in the body.

   b) The yokearm and upper assembly should now be removed intact.* This may be done by turning the handwheel in a clockwise direction until the stem bushing comes free of the stem. A sling should be used for lifting the upper assembly after it has been freed. The packing gland flange, take-up flange and face ring are removed during this operation as they clear the top of the stem.

* For other types of Upper Assemblies such as Bevel Gear etc. see pages 43, 44, 45, and 46.



7. Lift the bonnet along with the gland, protective ring and gasket out of the body, care being taken not to scar the gasket seating surface of the body.

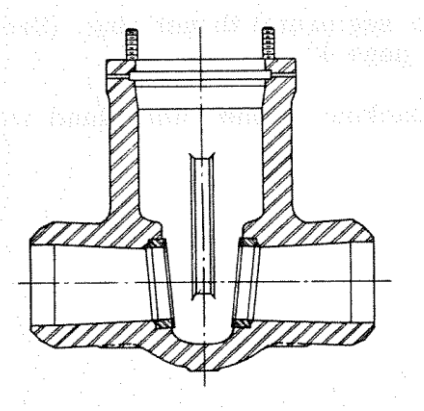


8. a) Mark the wedge and body so that the wedge may be re-installed in the same orientation.

   b) Remove the wedge and stem. If no work is to be done on the wedge it should be re-installed in the body carefully so no damage is done to the seating surfaces.

REASSEMBLY

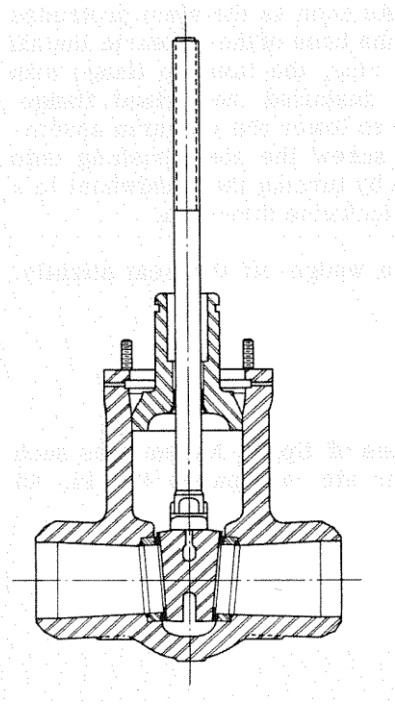
BONNET TAKE-UP SCREW DESIGN
(BOLTED YOKEARM STYLE)



1. a) The gasket seating surfaces of the bonnet and body should be lapped and free of any scars. See pages 48 and 49.

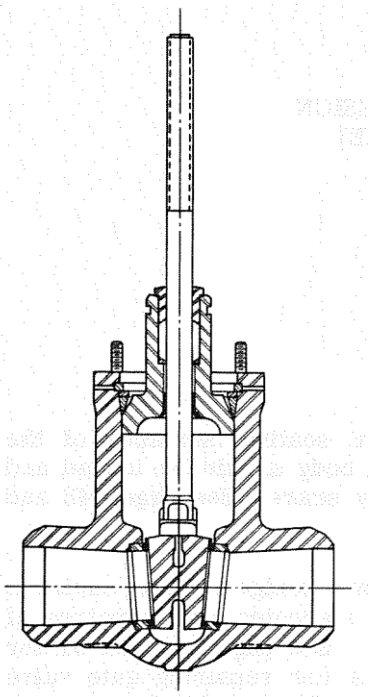
   b) Seat ring and wedge seating surfaces should be inspected and repaired if necessary. See pages 50 and 51 for instructions for repairing gate valve seats, pages 52 through 56 for instructions for repairing globe and angle type valve seats.

   c) Clean the body and bonnet seating surfaces.



2. a) Put the wedge and stem in place, making sure the wedge has the same orientation as when disassembled.

   b) Insert the bonnet into the body.

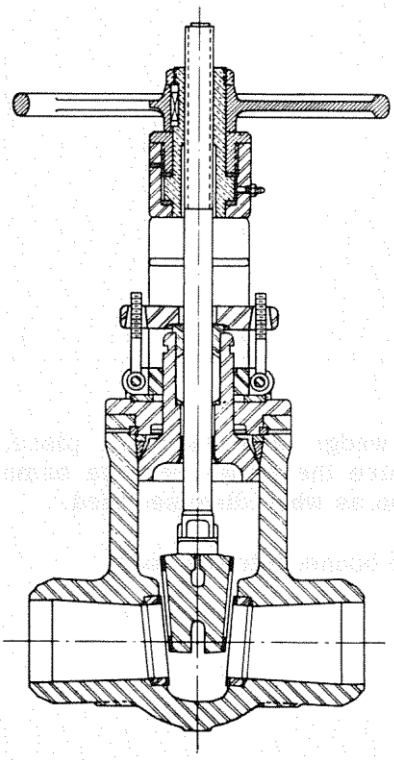


3. a) Put a new gasket in place, making sure all surfaces are clean. (It is essential to install a new gasket whenever the pressure seal joint is broken.) (See page 47 for special instructions.)

   b) Protective ring is oversize and must be machined or ground to fit body.

   c) Insert the segmental thrust ring. (See sketch on page 42.)

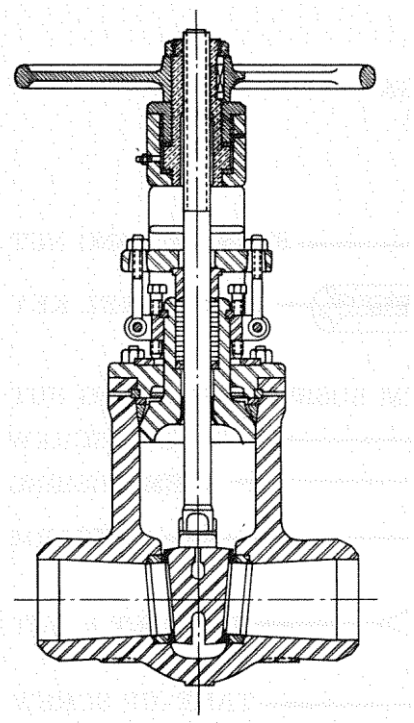
   d) Put the packing washer and gland on the stem.



4. a) Place the yokearm assembly over the stem.* As soon as the stem protrudes through the base of the yokearm install the face ring, the take-up flange with eyebolts installed and gland flange. Continue to lower the yokearm assembly and screw the stem bushing onto the stem by turning the handwheel in a counterclockwise direction.

   b) Raise the wedge off the seat slightly.

* For other types of Upper Assemblies such as Bevel Gear etc. see pages 43, 44, 45, and 46.



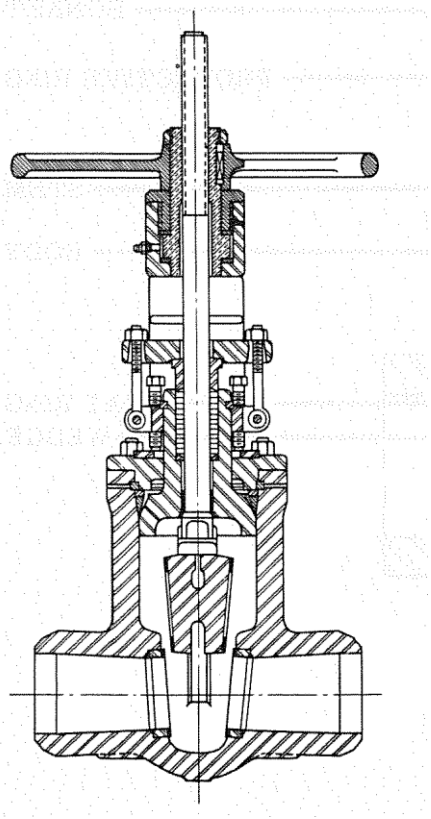
5. a) Install and tighten nuts on the yokearm studs.

   b) Close valve.

   c) Install packing with the cut in the packing rings staggered.

   d) Install the split thrust ring and take-up screws. The take-up screws are to be thoroughly lubricated with a mixture of oil and graphite prior to installation.

   e) Install and tighten eyebolt nuts.



6. a) Open valve until back seat shoulder seats solidly in the bonnet to set the gasket.

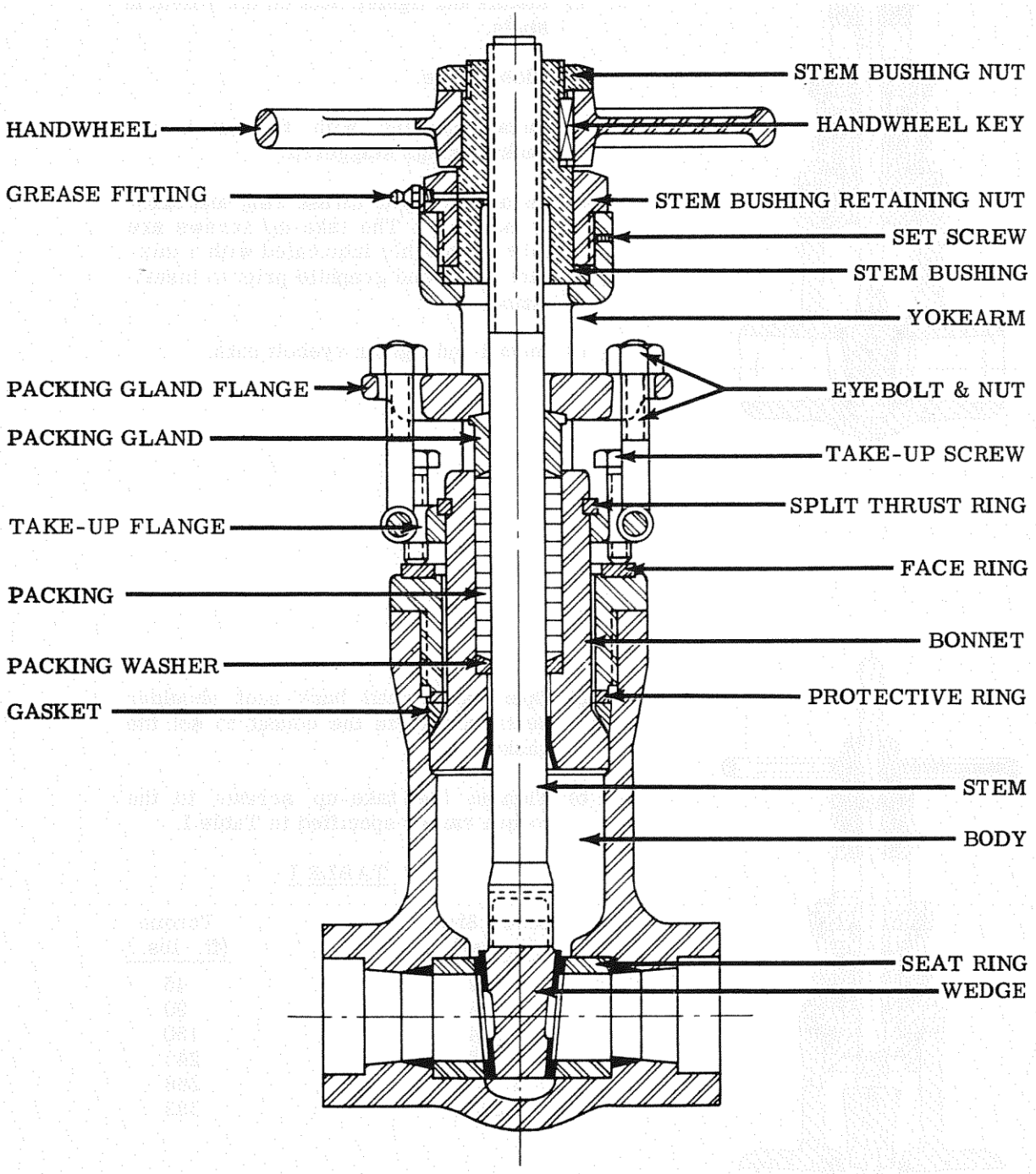
   b) Tighten the take-up screws to the torque values specified in Table I.

TABLE I

Screw Size (inches)	Torque (ft. –lbs.)
1/2	45
5/8	90
3/4	150
7/8	240
1	368
1-1/8	533

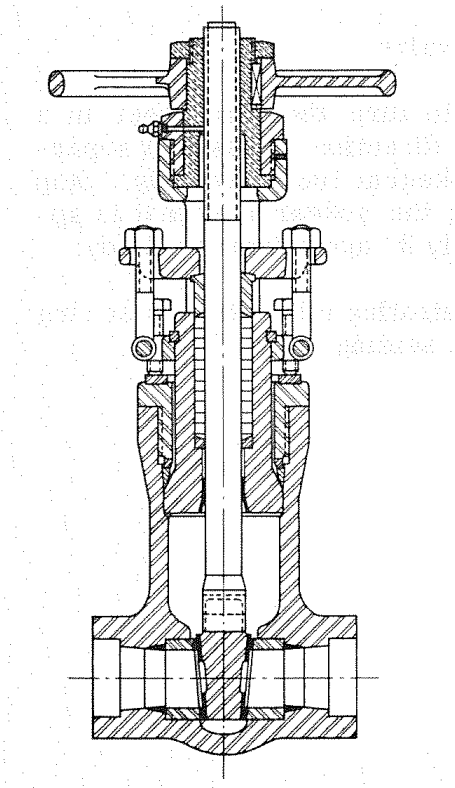
O.S.Y. GATE VALVE

BONNET TAKE-UP SCREW DESIGN
(THREADED YOKEARM STYLE)



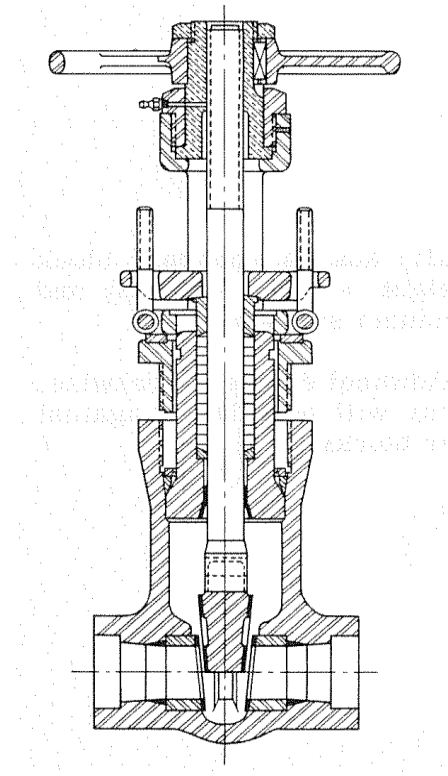
DISASSEMBLY

BONNET TAKE-UP SCREW DESIGN
(THREADED YOKEARM STYLE)



1. a) Make sure there is no pressure in the valve.

   b) A sling should be provided for removing the yokearm and upper assembly.

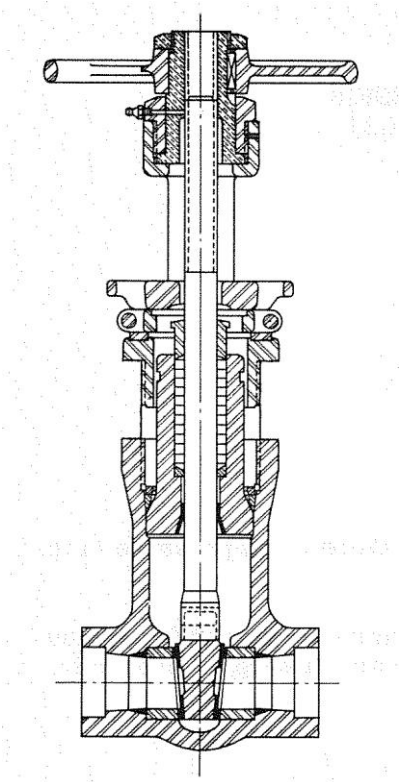


2. a) Place the valve in the half-open position. This relieves any pressure trapped in the bonnet chamber.

   b) Remove nuts from eyebolts.

   c) Remove the take-up screws and split thrust ring.

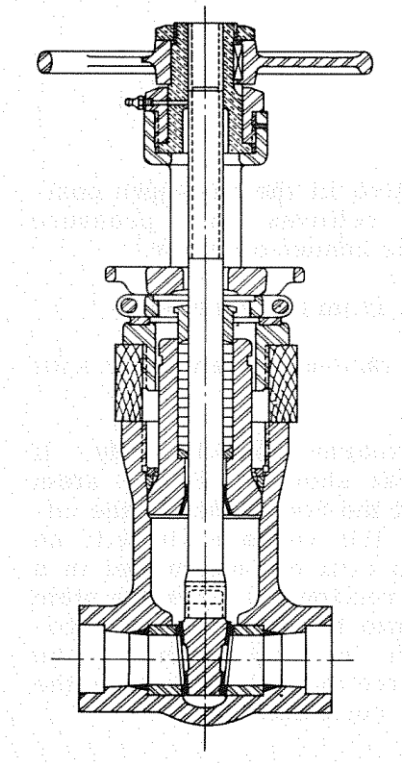
   d) Unscrew yokearm from the body. If the back seat shoulder of the stem seats against the bonnet during the unscrewing of the yokearm it will be necessary to turn the handwheel in a clockwise direction to lower the stem and wedge into the body before proceeding with the unscrewing of the yokearm. Note that the threads on the yokearm are right hand.



3. a) Close the valve.

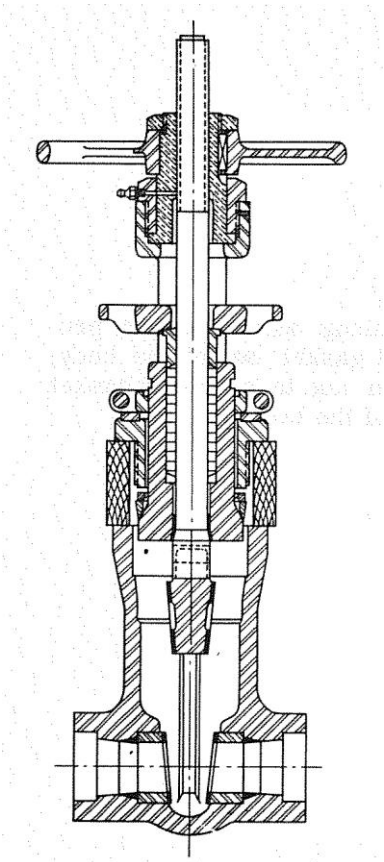
   b) Continue to turn the handwheel in a clockwise direction. This will separate the yokearm from the body. Stop separating the yokearm when it is approximately 2" apart from the body.

   c) Apply penetrating oil to the thrust ring and gasket seating area.

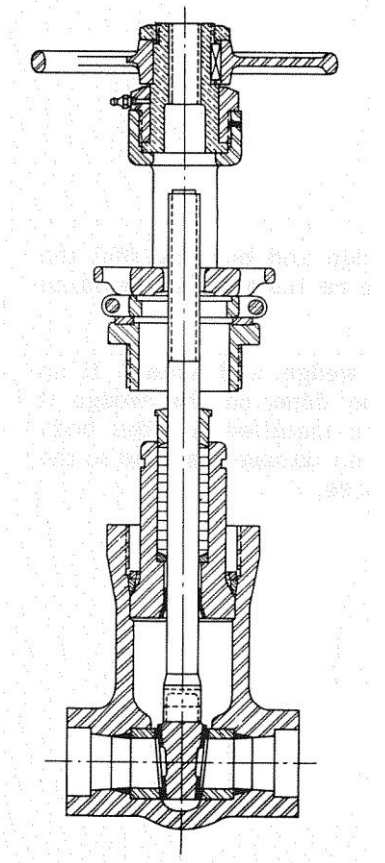


4. a) Insert equally spaces spreader block of equal height between the body and yoke arm contact surfaces.

   b) Turn the handwheel counterclockwise. The yokearm will now lower against the spreader blocks.



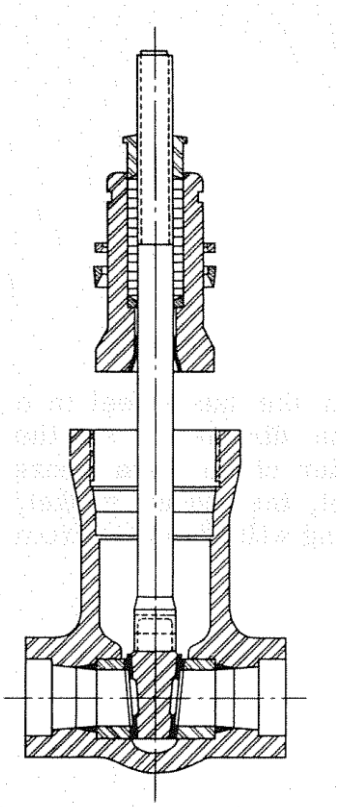
5. a) Continue to turn the handwheel in a counterclockwise direction. As the back seat shoulder of the stem seats against the bonnet, the bonnet, gasket, and protective ring will be raised from the body.



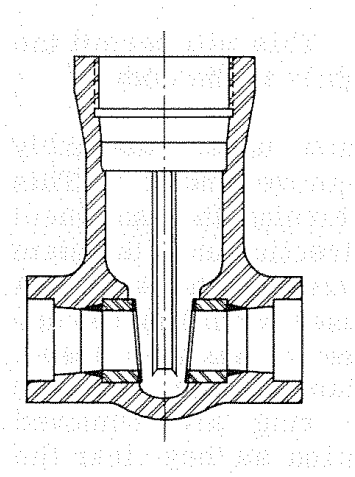
6. a) Close the valve. This will permit the bonnet to rest lightly in the body.

   b) The yokearm and upper assembly should now be done by turning the handwheel in a clockwise direction until the stem bushing comes free of the stem. A sling should be used for lifting the upper assembly after it has been freed. The packing gland flange, take-up flange and face ring are removed during this operation as they clear the top of the stem.

* For other types of Upper Assemblies such as Bevel Gear etc. see pages 43, 44, 45, and 46.



7. Lift the bonnet along with the gland, protective ring and gasket out of the body, care being taken not to scar the gasket seating surface of the body.

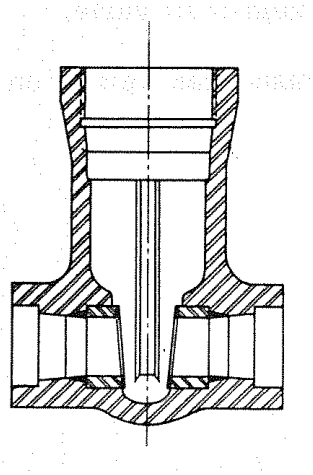


8. a) Mark the wedge and body so that the wedge may be re-installed in the same orientation.

   b) Remove the wedge and stem. If no work is to be done on the wedge it should be re-installed in the body carefully so no damage is done to the seating surfaces.

REASSEMBLY

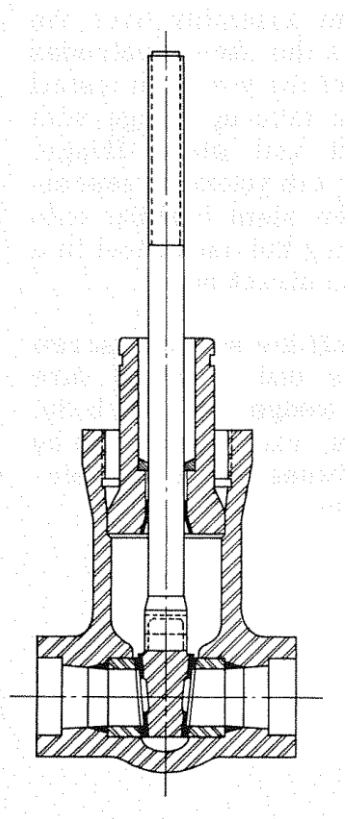
BONNET TAKE-UP SCREW DESIGN
(THREADED YOKEARM STYLE)



1. a) The gasket seating surfaces of the bonnet and body should be lapped and free of any scars. See pages 48 and 49.

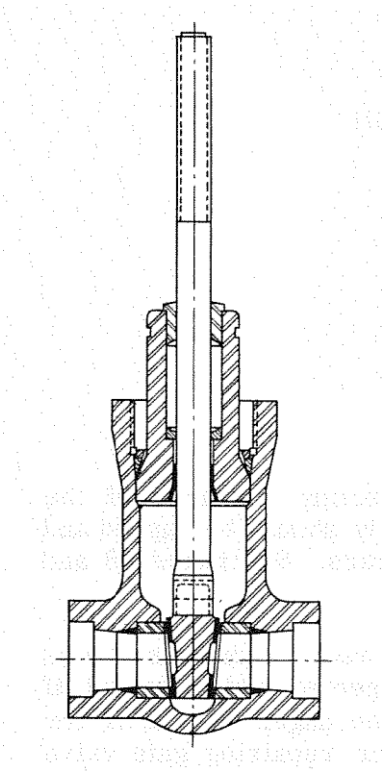
   b) Seat ring and wedge seating surfaces should be inspected and repaired if necessary. See pages 50 and 51 for instructions for repairing gate valve seats, pages 52 through 56 for instructions for repairing globe and angle type valve seats.

   c) Clean the body and bonnet seating surfaces.



2) a) Put the wedge and stem in place, making sure the wedge has the same orientation as when disassembled.

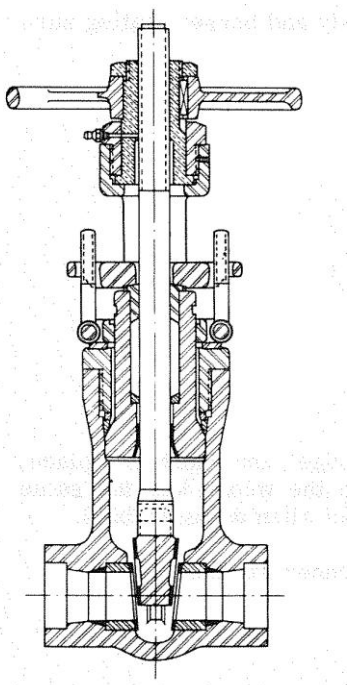
   b) Insert the bonnet into the body.



3. a) Put a new gasket in place, making sure all surfaces are clean. (It is essential to install a new gasket whenever the pressure seal joint is broken) (See page 47 for special instructions.)

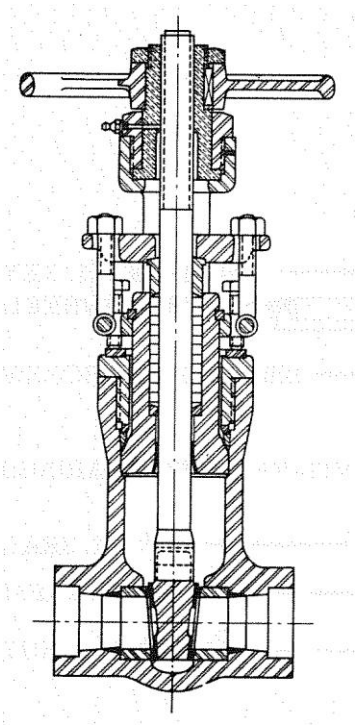
   b) Protective ring is oversize and must be machined or ground to fit valve.

   c) Put the packing washer and gland on the stem.



4. a) Place the yokearm assembly over the stem. As soon as the stem protrudes through the base of the yokearm install the face ring, the take-up flange with eyebolts installed and grand flange. Continue to lower the yokearm assembly and screw the stem bushing onto the stem by turning the handwheel in a counterclockwise direction.

   b) Raise the wedge off the seat and screw yokearm into the body making sure not to force the wedge into the body. If the wedge seats, raise the wedge by turning the handwheel in a counterclockwise direction.

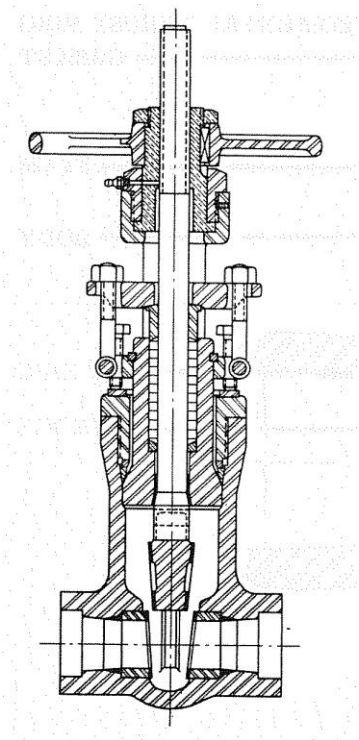


5. a) Close valve.

   b) Install packing with the cut in the packing rings staggered.

   c) Install the split thrust ring and take-up screws. The take-up screws are to be thoroughly lubricated with oil and graphite prior to installation.

   d) Install and tighten the eyebolt nuts.



6. a) Open valve until back seat shoulder seats solidly in the bonnet to set the gasket.

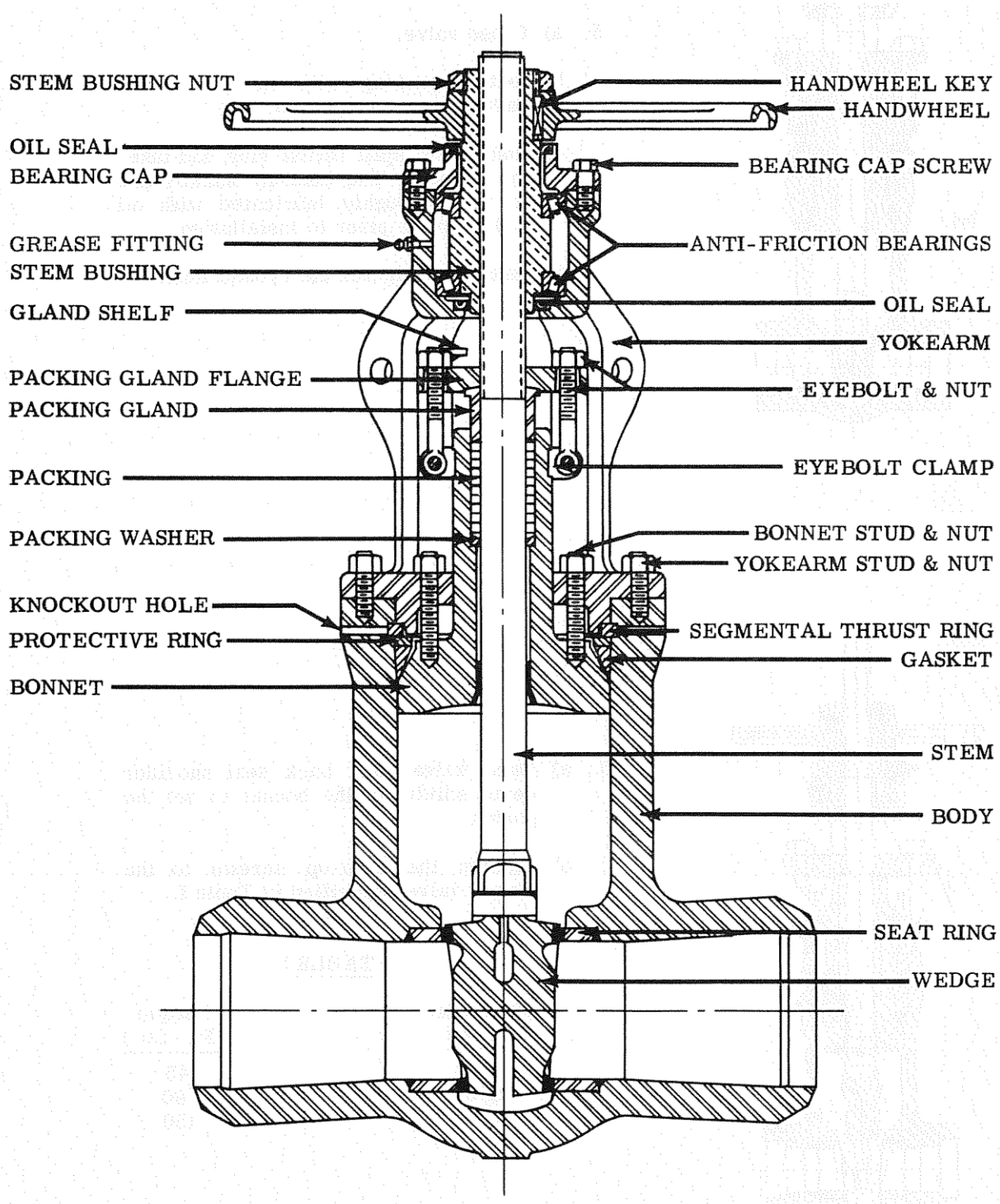
   b) Tighten the take-up screws to the torque valves specified in Table I.

TABLE I

Screw Size (inches)	Torque (ft. –lbs.)
1/2	45
5/8	90
3/4	150

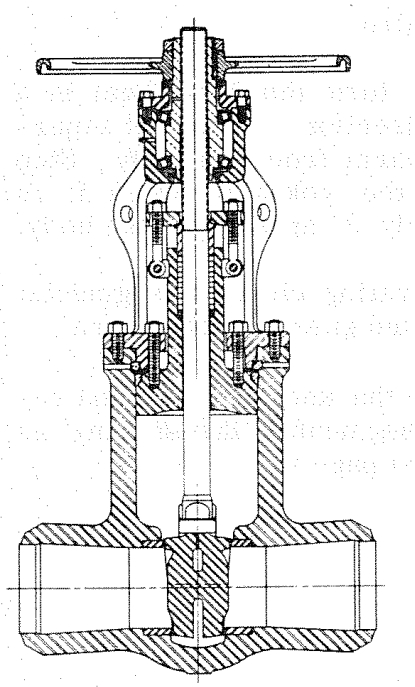
O.S. & Y. GATE VALVE

BONNET STUD DESIGN



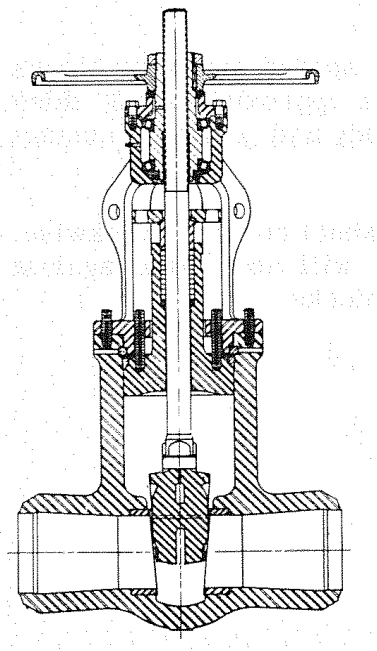
DISASSEMBLY

BONNET STUD TYPE



1. a) Make sure there is no pressure in the valve.

   b) A sling should be provided for removing the yokearm and upper assembly.



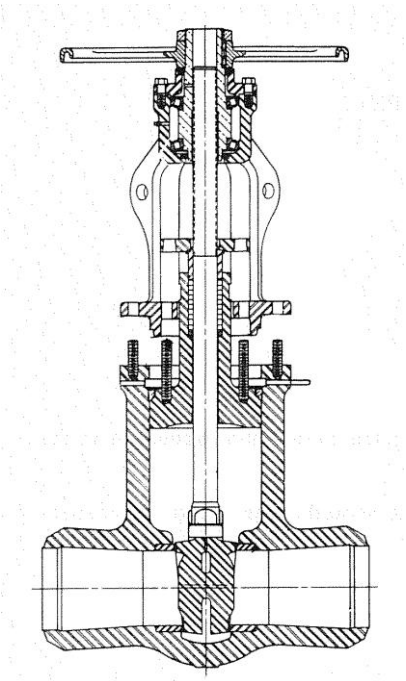
2. a) Place the valve in the half-open position. This relieves any pressure trapped in the bonnet chamber.

   b) Remove nuts from the eyebolts and remove the eyebolt clamp.

   c) Remove the yokearm nuts.

   d) Remove the bonnet nuts.

   e) Tap the bonnet until it slides into the body and frees the segmental thrust ring.

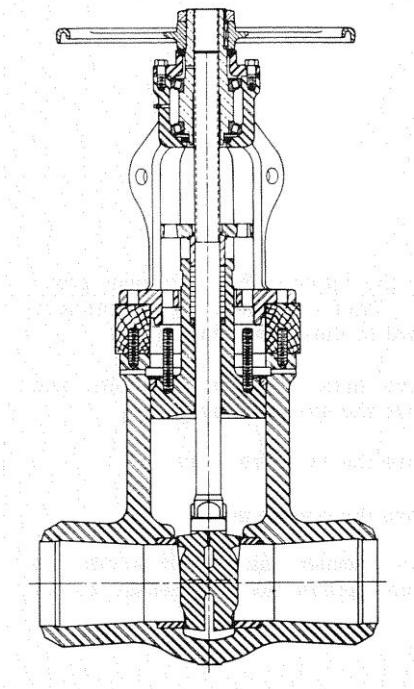


3. a) Close the valve.

   b) Continue to turn the handwheel in a clockwise direction. This will separate the yokearm from the body. Stop separating the yokearm when it is approximately 3" apart from the body.

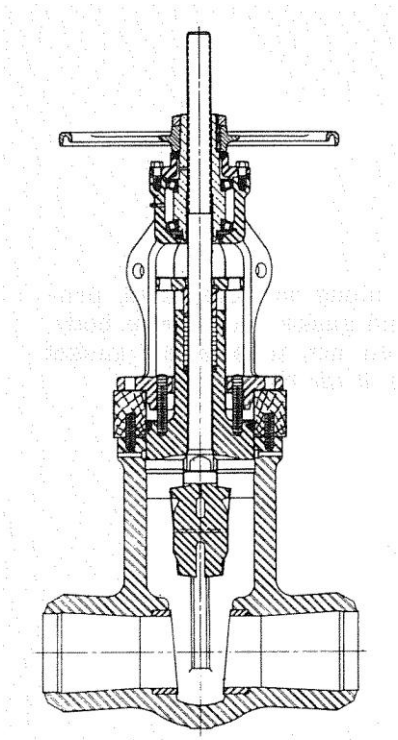
   c) Apply penetrating oil to the segmental thrust ring and gasket seating area.

   d) Insert pin in the knockout hole and remove the segmental thrust ring as illustrated on page 42.

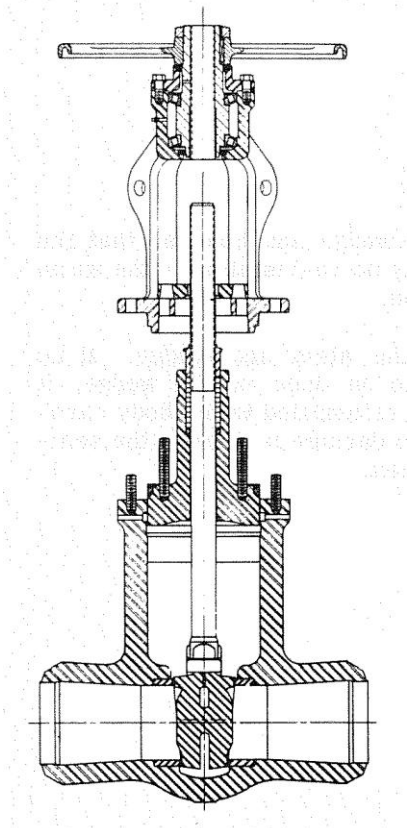


4. a) Insert equally spaced spreader blocks of equal height approximately 3" thick between the body and yokearm contact surfaces.

   b) Turn the handwheel counterclockwise. The yokearm will now lower against the spreader blocks.



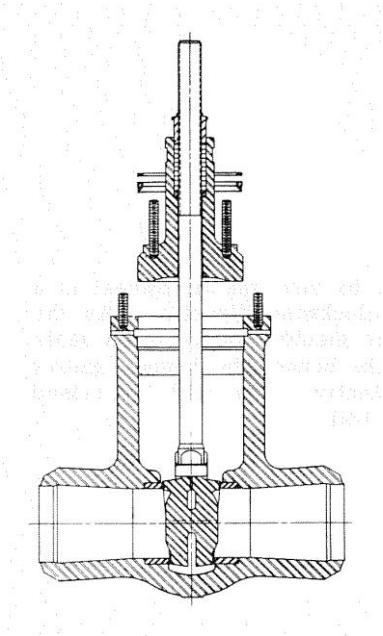
5. a) Continue to turn the handwheel in a counter-clockwise direction. As the back seat shoulder of the stem seats against the bonnet, the bonnet, gasket and protective ring will be raised from the body.



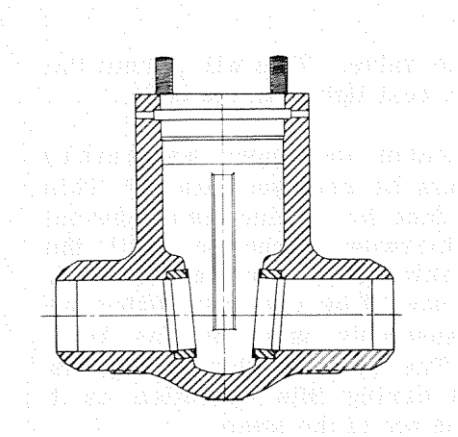
6. a) Close the valve. This will permit the bonnet to rest lightly in the body.

   b) The yokearm and upper assembly should now be removed intact.* This may be done by turning the handwheel in a clockwise direction until the stem bushing comes free of the stem. A sling should be used for lifting the upper assembly after it has been freed. The packing gland flange is removed during this operation as it clears the top of the stem.

* For other types of Upper Assemblies such as Bevel Gear etc. see pages 43, 44, 45, and 46.



7. Lift the bonnet along with the gland, protective ring and gasket out of the body, care being taken not to scar the gasket seating surface of the body.

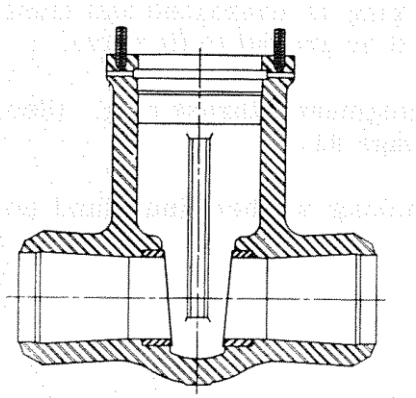


8. a) Mark the wedge and body so that the wedge may be re-installed in the same orientation.

   b) Remove the stem and wedge. If no work is to be done on the wedge, it should be reinstalled in the body carefully so no damage is done to the seating surfaces.

REASSEMBLY

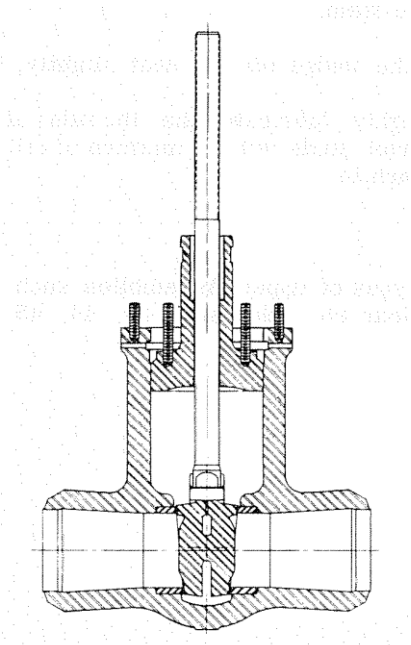
BONNET STUD DESIGN



1. a) The gasket seating surfaces of the body and bonnet should be lapped and free of any scars. See pages 48 and 49.

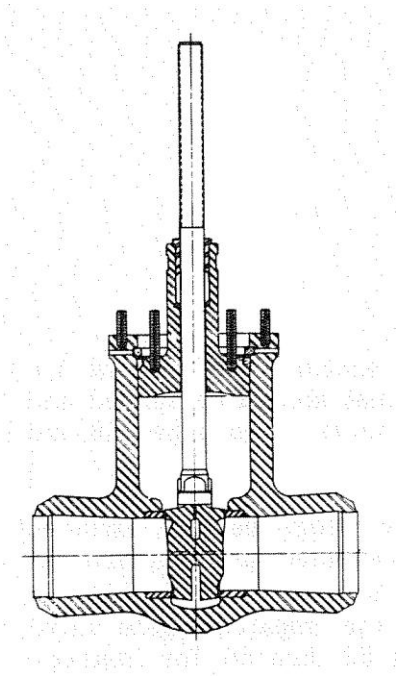
   b) Seat ring and wedge seating surfaces should be inspected and repaired if necessary. See pages 50 and 51 for instructions for repairing gate valve seats, pages 52 through 56 for instructions for repairing globe and angle type valve seats.

   c) Clean the body and bonnet seating surfaces.



2. a) Put the wedge and stem in place, making sure the wedge has the same orientation as when disassembled.

   b) Insert the bonnet into the body.

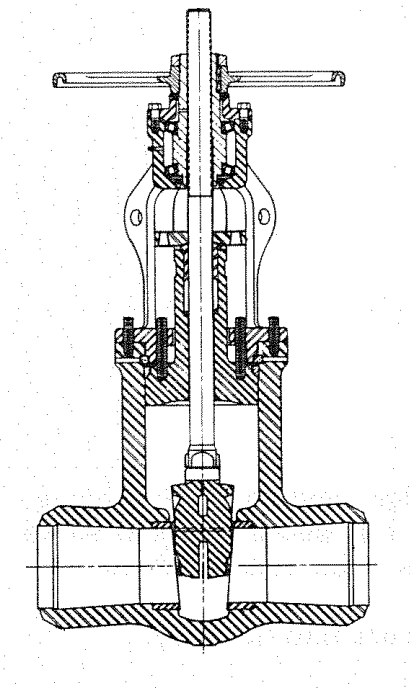


3. a) Put a new gasket in place, making sure all surfaces are clean. (It is essential to install a new gasket whenever the pressure seal joint is broken.) (See page 47 for special instructions.)

   b) Protective ring is oversized and must be machined or ground to fit valve.

   c) Insert the segmental thrust ring. (See sketch on page 42.)

   d) Put the packing washer and gland on the stem.

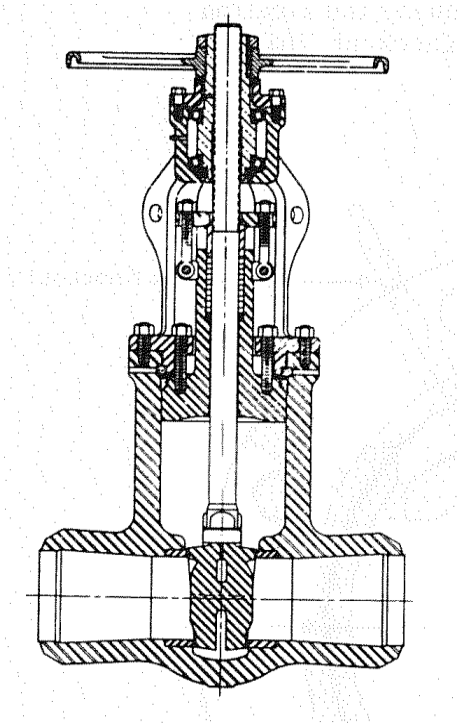


4. a) Place the yokearm assembly over the stem.* As soon as the stem protrudes through the base of the yokearm install the gland flange. Continue to lower the yokarm and screw the bushing onto the stem.

   b) Raise the wedge off the seat slightly.

   c) Thoroughly lubricate the threads of the bonnet studs with a mixture of oil and graphite.

* For other types of upper Assemblies such as Bevel Gear etc. see pages 43, 44, 45, and 46.



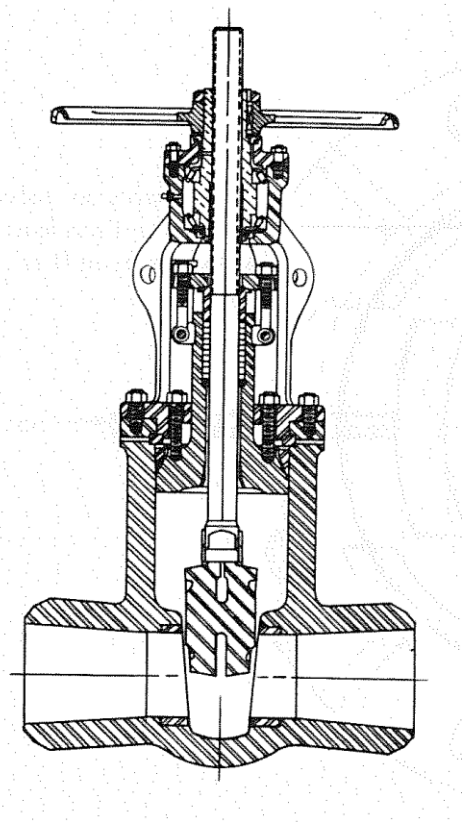
5. a) Install eyebolt clamp and eyebolts.

   b) Install and tighten the nuts on the yokearm studs.

   c) Close valve.

   d) Install packing with the cut in the packing rings staggered.

   e) Install and tighten nuts on eyebolts.



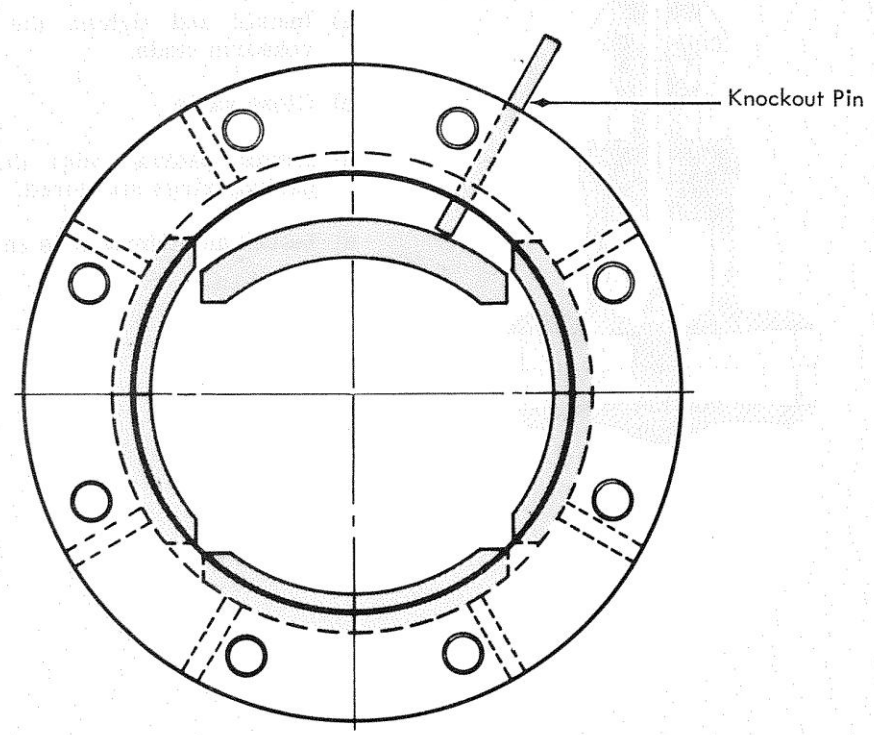
6. a) Open valve until back seat shoulder seats solidly in the bonnet to set the gasket.

   b) Install and tighten the nuts on the bonnet studs to the torque valves as specified in Table I.

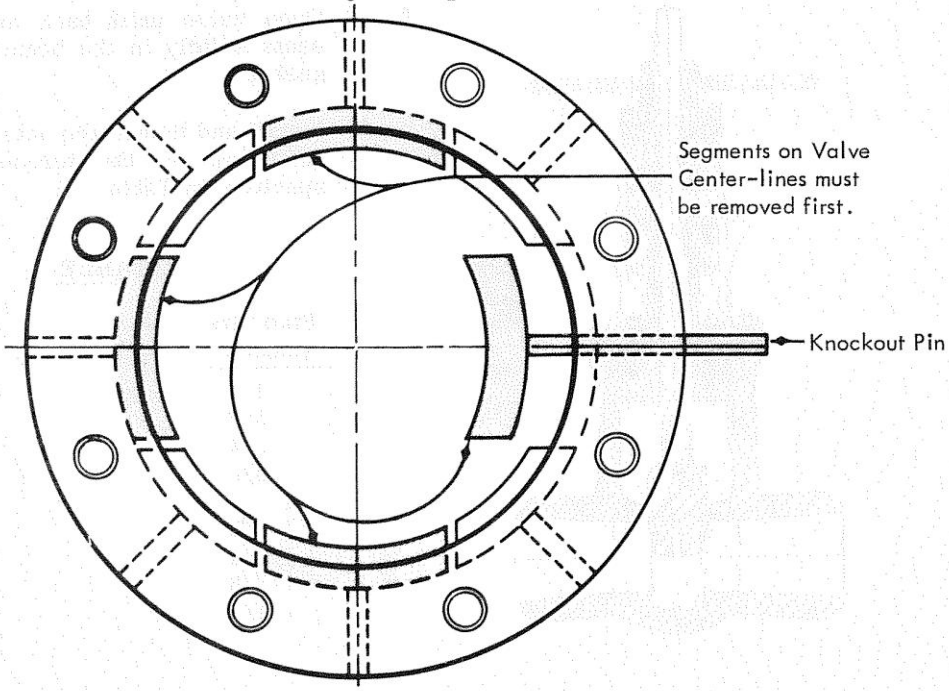
TABLE I

Screw Size (inches)	Torque (ft. –lbs.)
1/2	45
5/8	90
3/4	150
7/8	240
1	368
1-1/8	533
1-1/4	750
1-3/8	1020
1-1/2	1200

Types of Segmental Thrust Rings showing the location
of the segments in relation to the Knockout Holes.

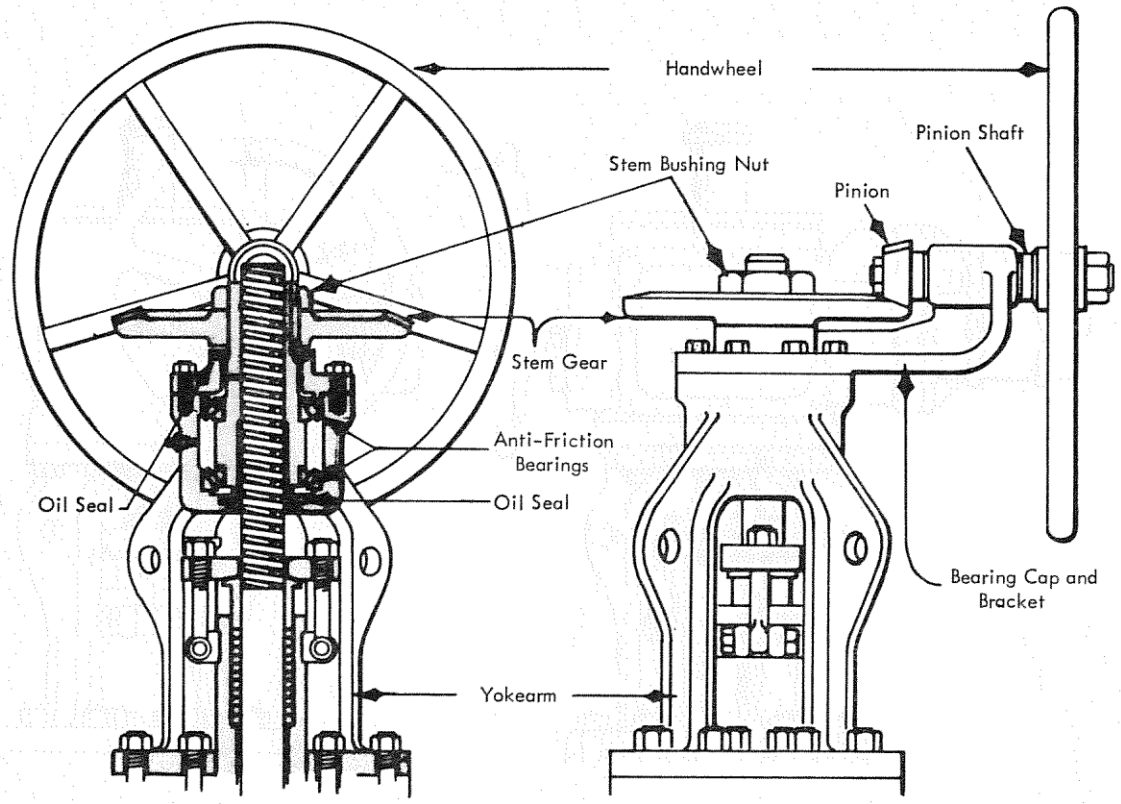


Four - Segment Ring

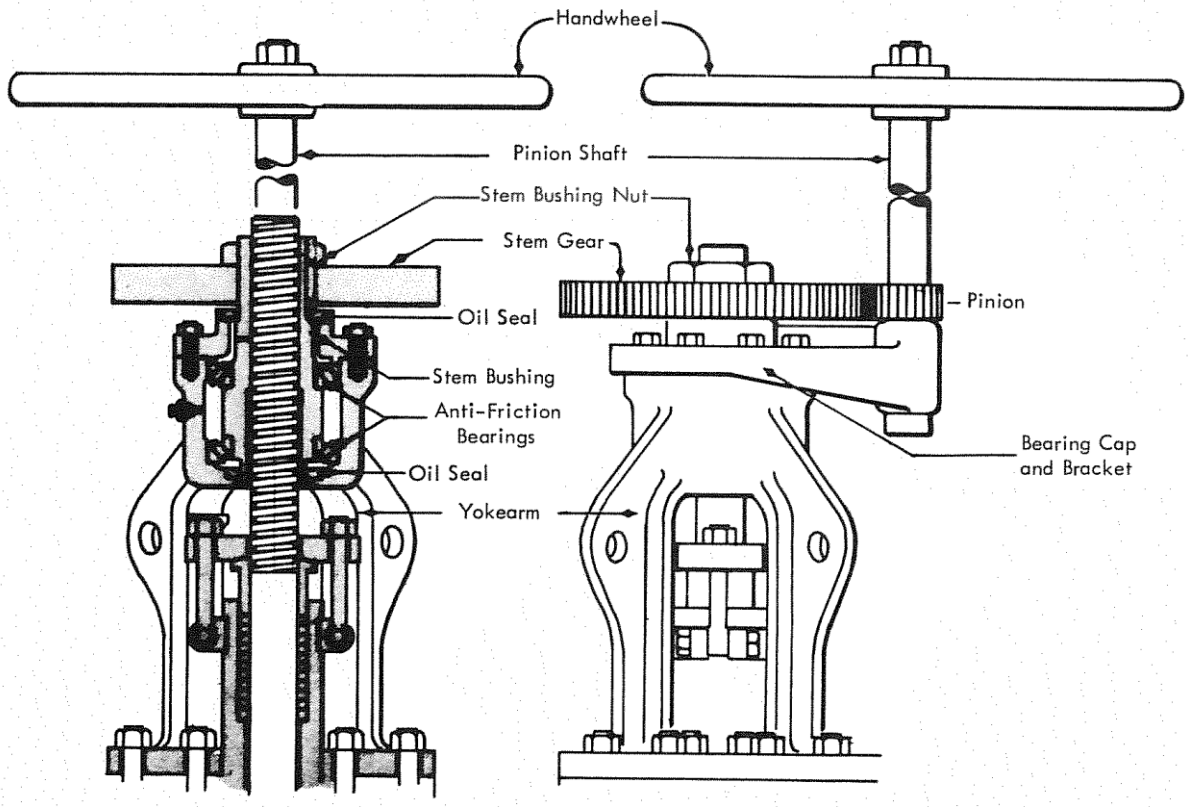


Eight - Segment Ring

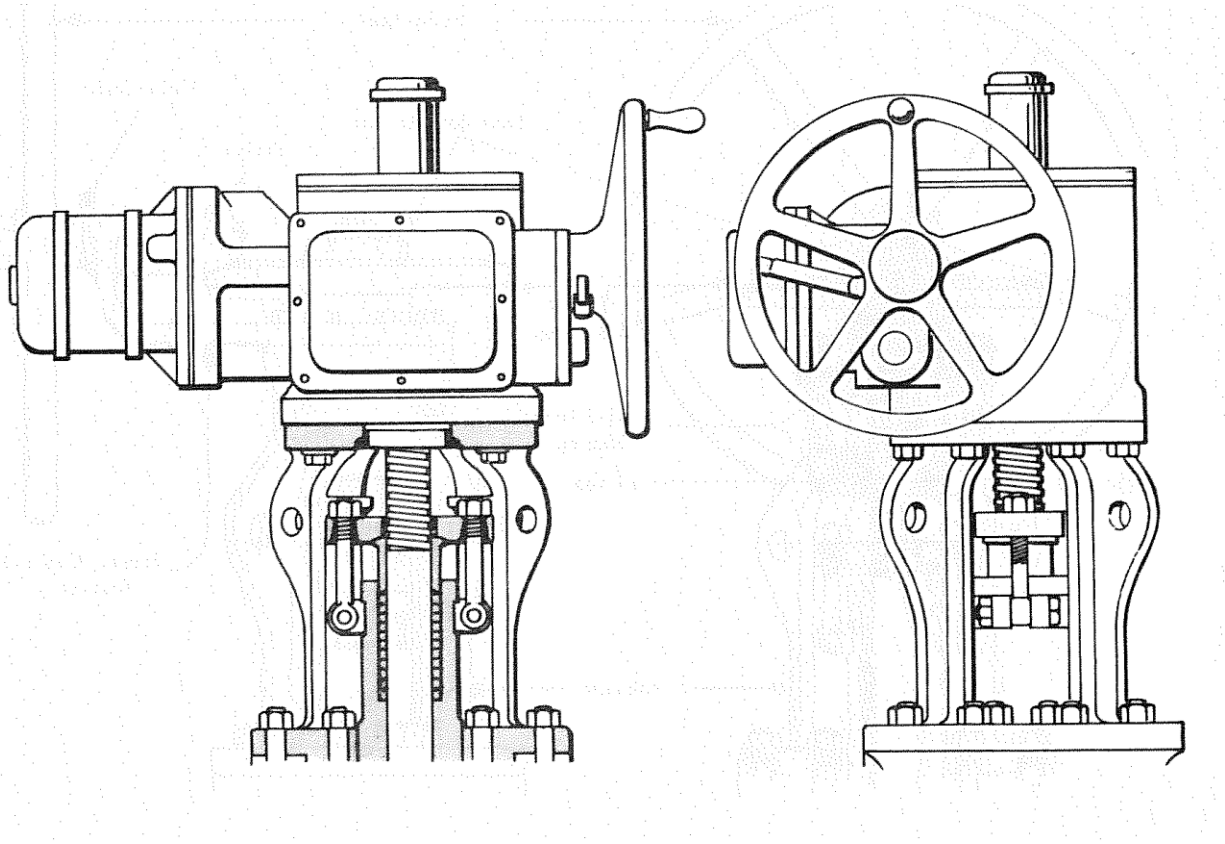
Upper Assembly of Bevel Gear Operated Valves



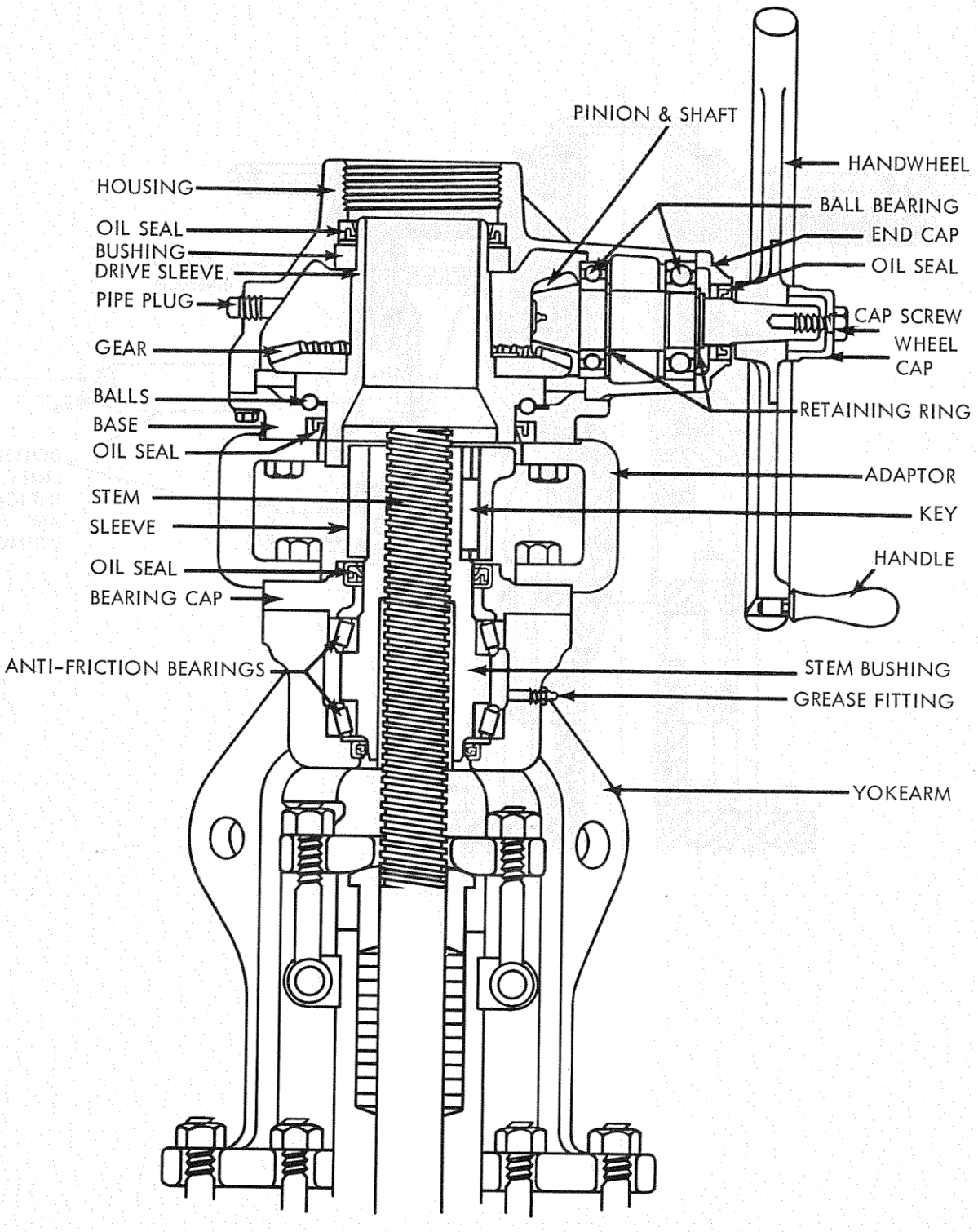
Upper Assembly of Spur gear Operated Valves



Upper Assembly of Motor Operated Valves

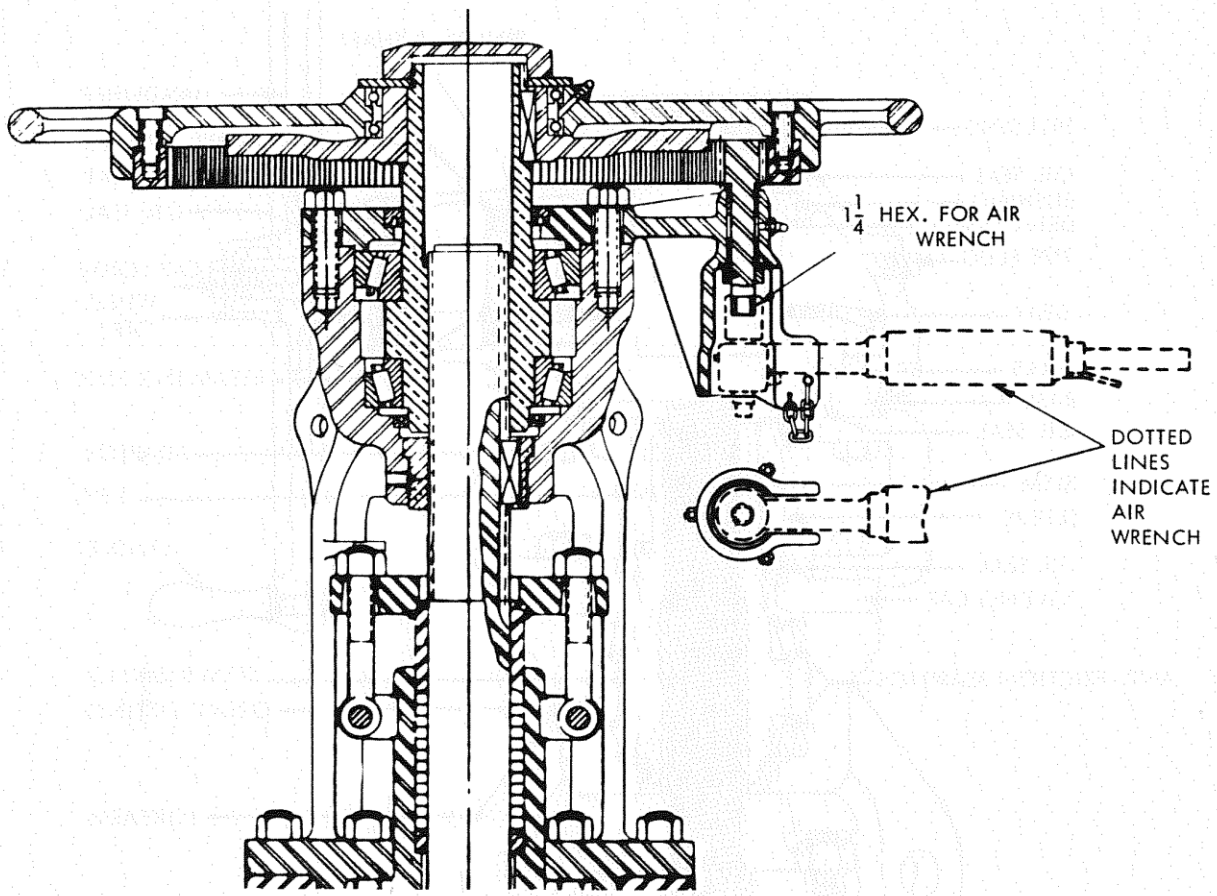


UPPER ASSEMBLY OF ADAPTO GEAR OPERATED VALVES



UPPER ASSEMBLY OF GEARED HAMMER BLOW HANDWHEEL

For Portable Air Wrench Operation



SPECIAL INSTRUCTIONS FOR EXTREME LAPPING
OR GRINDING OR THE PRESSURE SEAL GASKET SEAT

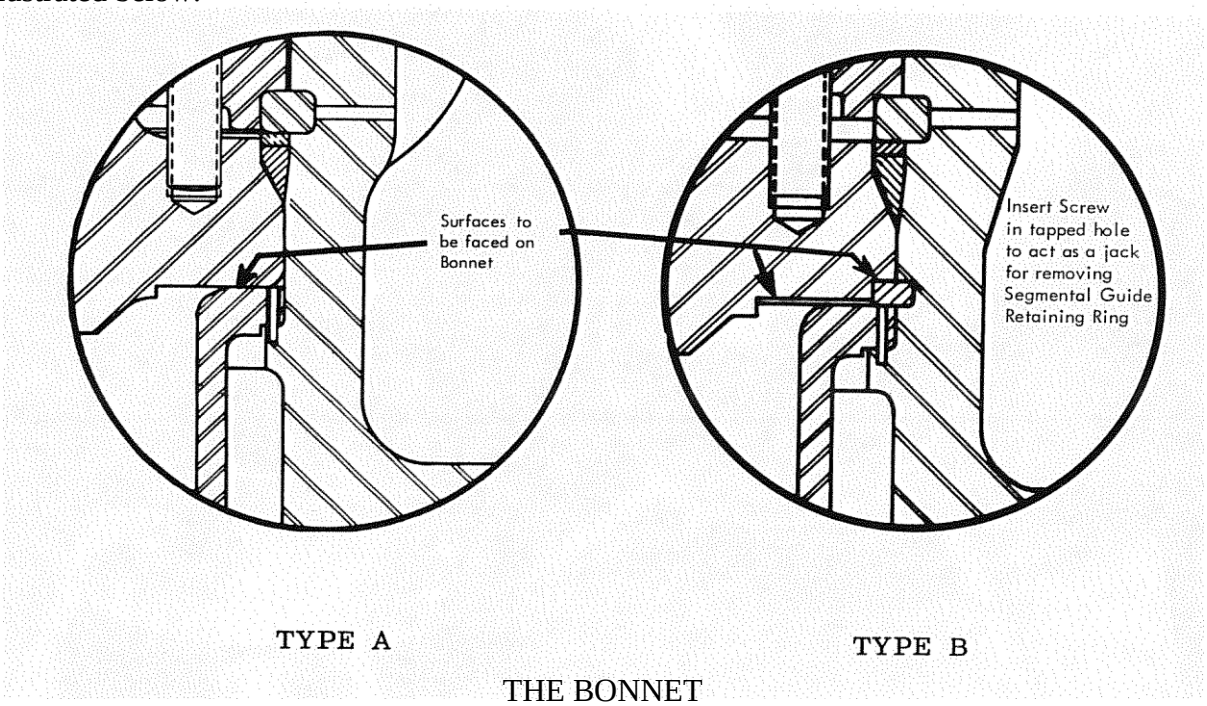
THE BODY
FOR VALVES WITH TAPERED BODY NECK DESIGN

If the pressure seal gasket seat in the body has steam cuts, extensive lapping may be necessary. This results in a dropping of the pressure seal seat in the body. The maximum allowable clearance between the segmental thrust rings and the protective ring is .010 inches (see drawing page 58). If extensive lapping causes a greater clearance, an oversize protective ring must be installed. These are normally supplied 1/16" oversize in thickness and must be faced off to fit.

After prolonged lapping the lap may have worn off angle. A machine cut should be taken off the lap to correct this angle prior to final lapping.

Special grinding tools are available that greatly accelerate repair of a valve that requires considerable metal removal from the seat. Final lapping should always be performed after grinding.

On GLOBE, ANGLE CHECK and NON-RETURN VALVES equipped with renewable guides either Type "A" or Type "B" design, it may be necessary to face off the bottom of the cap or bonnet to compensate for the additional depth of the body pressure seal gasket seat. This is illustrated below.


Surfaces to be faced on Bonnet
Insert Screw in tapped hole to act as a jack for removing Segmental Guide Retaining Ring
TYPE A
TYPE B

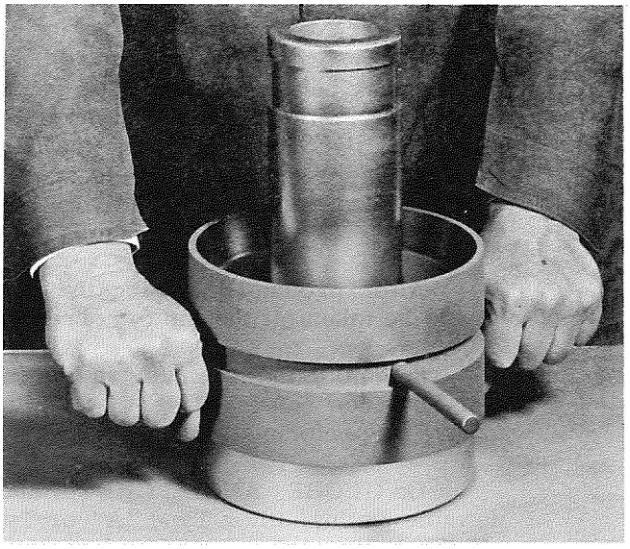
THE BONNET

If the pressure seal seat in the bonnet has steam cuts it is recommended that the seating surface be faced off on a lathe and then lapped.

INSTRUCTIONS FOR LAPPING PRESSURE SEAL JOINT

AFTER THE VALVE HAS BEEN DISASSEMBLED, THE INSIDE OF THE BODY AND OUTSIDE OF THE BONNET SHOULD BE CLEANED, AND THE BODY SEATING SURFACE AND THE BONNET SEATING SURFACE EXAMINED (SEE JOINT DETAIL, PAGE 58). IF EITHER OF THESE SEATS ARE MARRED OR SCORED THEY SHOULD BE LAPPED.

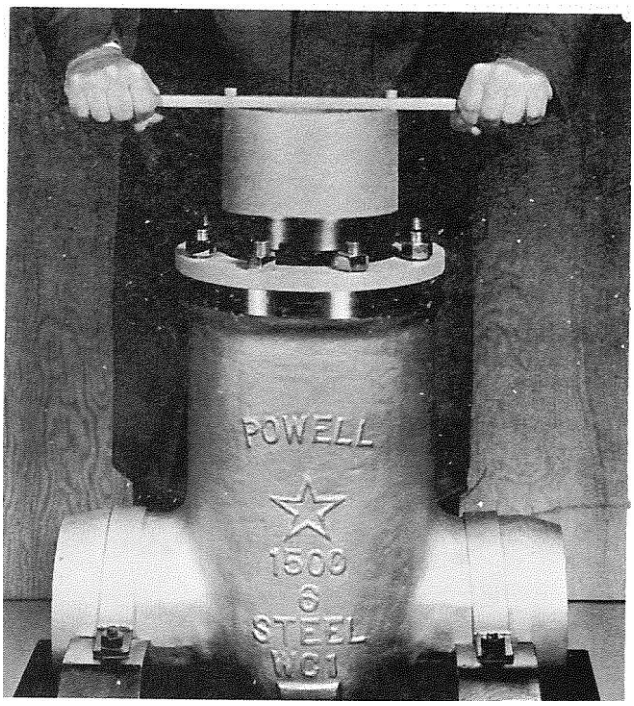
A LAP WITH A MATCHING INSIDE BEVEL SHOULD BE USED FOR THE BONNET. SPREAD A FINE LAPPING COMPOUND EVENLY ON THE BEVELED SURFACE, KEEPING THE OTHER SURFACES CLEAN.



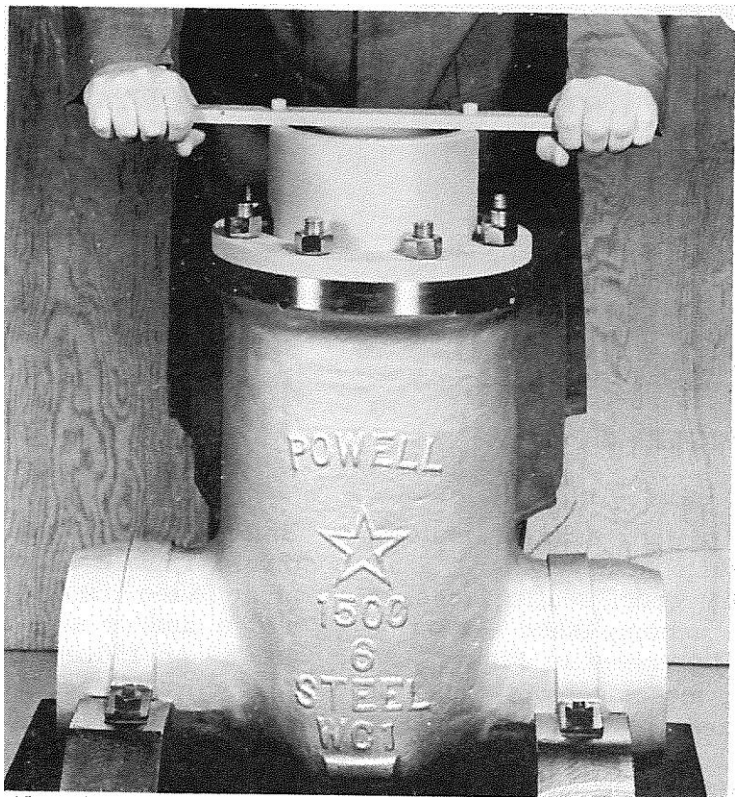
PLACE THE LAP OVER THE BONNET AND ROTATE THE LAP CLOCKWISE AND COUNTERCLOCKWISE APPROXIMATELY A QUARTER TURN. RAISE THE LAP OFF THE SEAT SLIGHTLY AT FREQUENT INTERVALS AND TURN APPROXIMATELY A HALF TURN AND CONTINUE LAPPING

CLEAN THE LAPPED SURFACES AND RUB A SMALL AMOUNT OF BLUING ON THE LAP. ROTATE THE LAP APPROX. 15 DEGREES OVER THE BONNET SEATING SURFACES AND THEN CHECK THE SURFACE FOR IMPERFECTIONS. IF THE SURFACE IS NOT PERFECT MORE LAPPING IS REQUIRED.

A LAP WITH A BEVEL TO AGREE WITH THE ANGLE IN THE BODY SHOULD BE USED. SPREAD A VERY FINE COMPOUD ON THE BEVELED SURFACE OF THE LAP, KEEPING THE OTHER SURFACES CLEAN.



INSERT THE LAP INTO THE BODY



LAP THE SEAT BY ROTATING THE LAP CLOCKWISE AND COUNTERCLOCKWISE APPROXIMATELY A QUARTER TURN. RAISE THE LAP OFF THE SEAT SLIGHTLY AT FREQUENT INTERVALS AND TURN APPROXIMATELY A HALF TURN AND CONTINUE LAPPING. CHECK THE SEAT PERIODICALLY WITH BLUING AS PREVIOUSLY DESCRIBED IF THE SEAT IS NOT PERFECT MORE LAPPING IS REQUIRED.

INSTRUCTIONS FOR REPAIR OF GATE VALVE SEATS

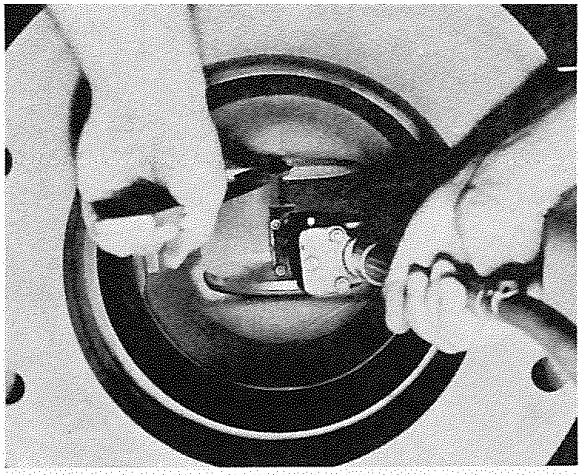


FIGURE 1

SEAT RINGS – A seat ring circling plate rotated by means of a right angle drive air wrench and pressure applied by a pressure bar should be used to remove mars or scoring from seat ring faces as illustrated in Figure 1.

FIGURE 2

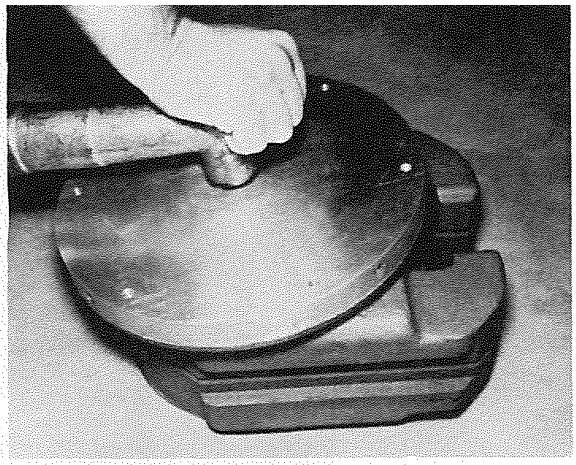


FIGURE 3

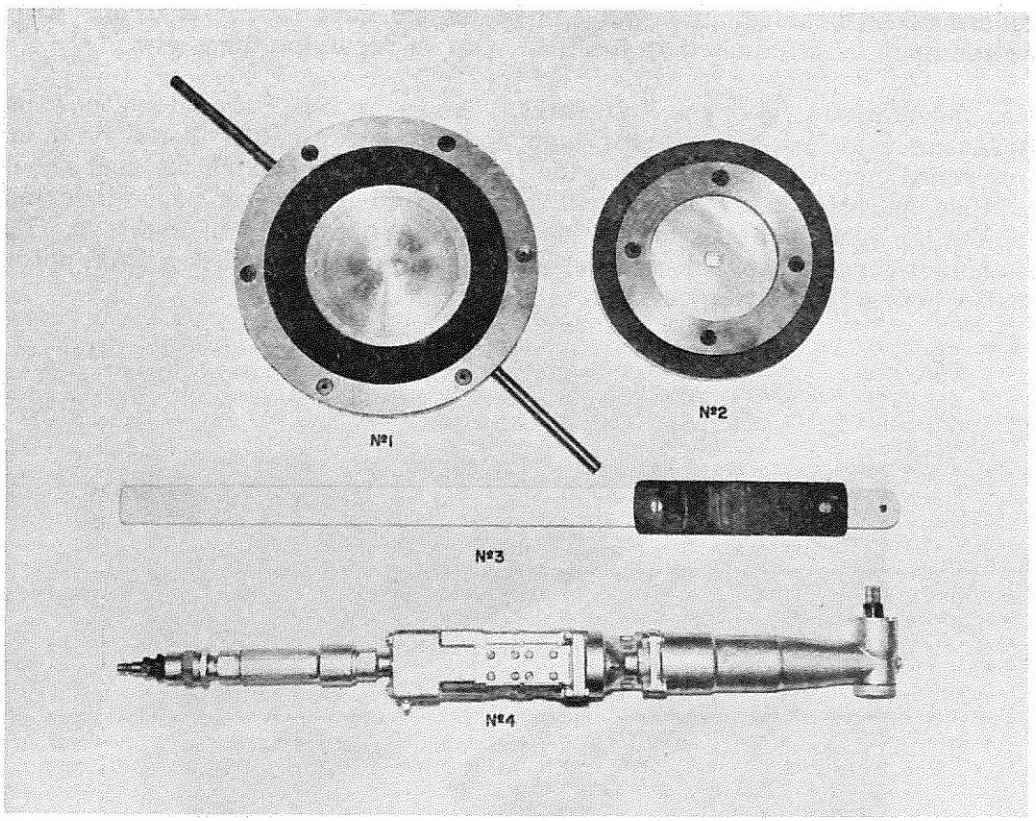
WEDGES – A wedge circling plate should be used to remove mars or scoring from the wedge seating faces. This can be accomplished either manually as illustrated in Figure 2 with oscillating movement of the circling plate and pressure applied downward on the handles, or by rotating the circling plate with a right angle drive air wrench driving the plate through the square in the top of the plate and pressure applied to the wrench above the square as illustrated in Figure 3.

Emery paper is installed between the circling plate and the guide plate prior to the circling operation on the wedge and/or seat rings. Grit No. 40, 80, or 150 emery paper is used depending on the severity of mar or scoring on the seating face. Progressive circling operations should be accomplished starting with the initial grit of emery paper used through each of the finer grits, the final polishing operation being with No. 150 grit.

After completion of the circling and polishing operations the seating surfaces of the wedge and seat rings should be thoroughly cleaned. A small amount of bluing should then be rubbed on both faces of the wedge, the wedge installed in the body in the seated position and tapped with a brass bar. The wedge should then be removed from the body by tapping on the outside of the valve body to jar the wedge loose. Both faces should be examined to insure that there is a complete round bearing.

Prior to reassembly of the valve the inside of the body and the entire wedge should be examined and any grit from the circling operation removed. The faces of the wedge and seat rings should be thoroughly cleaned.

Tools For Repairing Gate Valve Seats



Part No.	Description
1	Wedge Circling Plate
2	Seat Ring Circling Plate
3	Pressure Bar
4	Right Angle Drive Air Wrench

INSTRUCTIONS

FOR REPAIR OF

GLOBE AND ANGLE TYPE VALVE SEATS

Seat and disc seating surfaces should be examined visually for damage such as grooves resulting from erosion, pits or mars resulting from entrapment of foreign material between the seating surfaces, or out-of-round condition of the body or seat ring seating surface.

In most instances, it will be necessary to run a bearing check by rubbing a small amount of bluing on the disc seating surface, inserting the stem and disc assembly into the body and using the bonnet as a guide, rotate the stem and disc assembly approximately 15 degrees. After removing the bonnet and stem and disc assembly from the body, examine the body or seat ring seating surface. If the bluing transferred to the body or seat ring seating surface does not result in a complete round bearing, the seat can be assumed to be out-of-round and this condition must be eliminated as the first step on repairing the seats.

Where indentations, grooves, pit marks, mars or other imperfections on the body seat or seat ring are greater than approximately 0.010" deep, or where an out-of-round condition is indicated, the initial step in repairing the seat should be a circling operation using a lap with strips of 40 grit emery paper inserted between the lap plate and the lower guide plate as illustrated in Figure 1. Follow with another circling operation using 80 grit emery paper and a final polishing operation using 150 grit emery paper.

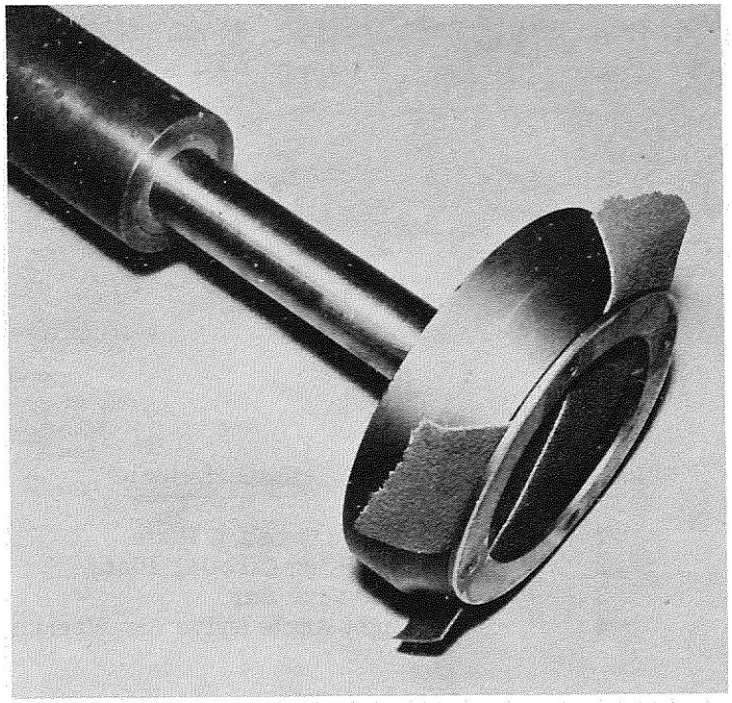


FIGURE 1

An upper lap guide assembly should be used during all circling and polishing operations. The upper guide assembly is to be bolted to the top of the body on all globe, angle and non-return (stop check) type valves, and screwed into the neck of the threaded retainer style check valves. Most guide assemblies for other style check valves are provided with brackets which extend down over the O.D. of the body and lock screws facilitate holding the guide in place. If this feature is not provided, it will be satisfactory in most cases to proceed without bolting the guide assembly to the body.

Rotation of the lap should be by means of an air wrench attached to the top of the lap shank. Figure 2 illustrates typical tool set-up used in the circling and polishing operations.

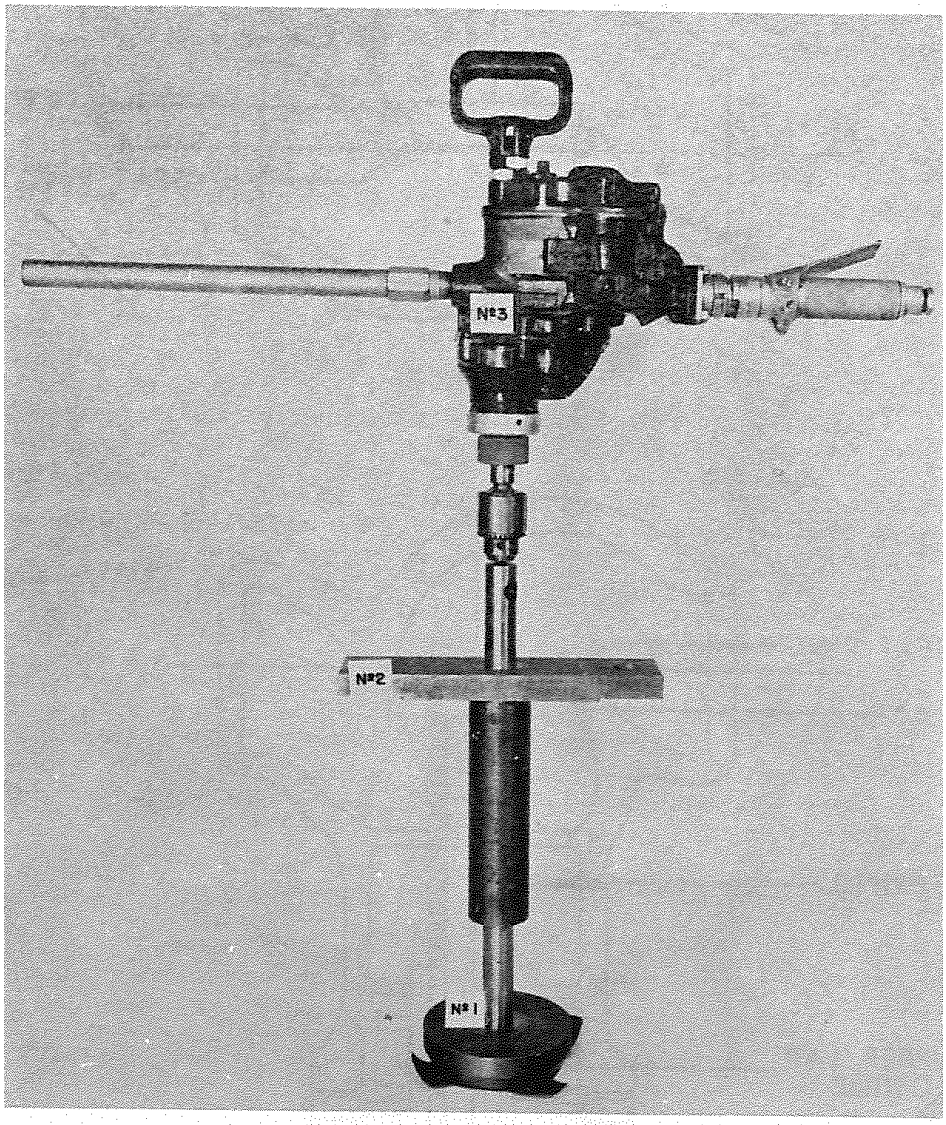


FIGURE 2

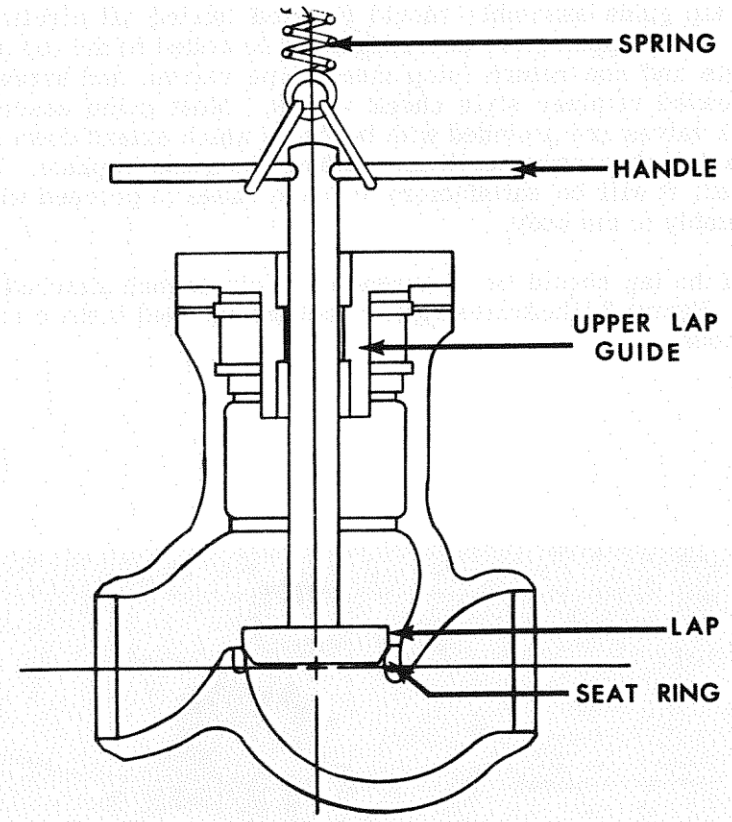


FIGURE 3

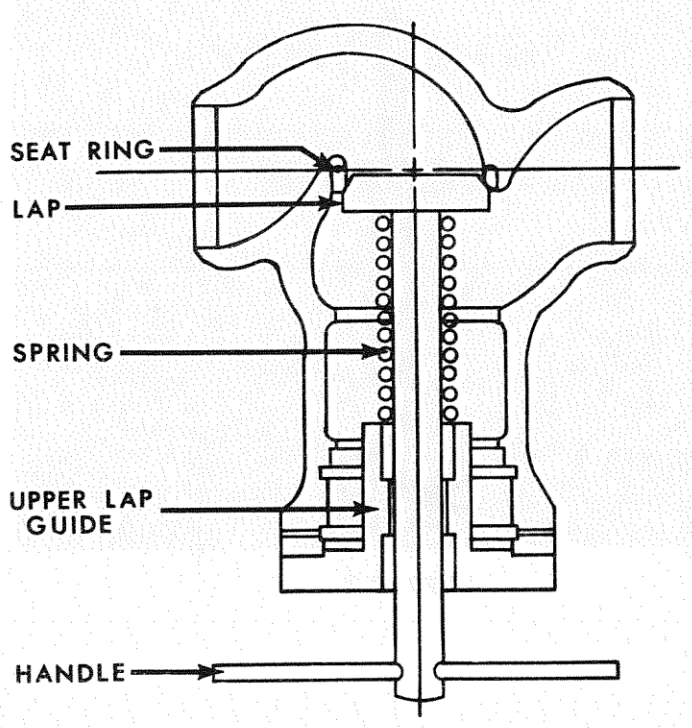


FIGURE 4

The circling and polishing operations on the body seat or seat ring should be followed by a lapping operation using the lap without the strips of emery paper. Spread a fine lapping compound evenly on the beveled surface of the lap. The upper guide assembly is to be used during the seat lapping operation. The lap handle should be inserted into the hole near the top of the lap shank. It is important that only light pressure be applied to the lap handle during lapping operations. Lap the seat by rotating the lap clockwise and counterclockwise approximately a quarter of a turn. Strokes should be light and the lap raised off the seat slightly and the lap rotated to a new position at frequent intervals. Apply fresh lapping compound frequently and continue lapping until imperfections are removed. The seat should be checked periodically with bluing following the method previously outlined. If the results of the bluing check do not indicate a full round bearing, additional lapping will be required.

On larger size valves, it will be necessary to partially support the lap by means of a spring as illustrated in Figure 3 to insure that the pressure of the lap against the seat is light. This method of support is recommended for large size valves which are installed in the line with the body neck up.

When globe or angle valves are installed in the neck down position, or in any position where the neck is below the horizontal, it will be necessary to hold the lap in place on the seat with light pressure applied to the lap by means of a spring between the lap guide assembly and the lap as illustrated in Figure 4.

The seat lapping operations using a lap should be followed by lapping the valve disc to the seat using the same procedures. The ball seat on the disc should be examined and any damage repaired before proceeding with the lapping of the disc to the seat.

On swivel disc design globe and angle valves, it will be necessary to remove the disc locknut washer to eliminate the end play in the stem and disc assembly; also, insert pin in regrinding pin hole on the side of the hexagon of the disc nut, making sure that the pin goes through the regrinding pin hole in the stem to insure rotation of the disc with the stem by means of the valve handwheel during the lapping operation.

On globe and angle valves which have a one-piece stem and disc, it will be necessary to install the special handle provided to facilitate rotation. The key in the handle collar fits the keyway in the stem and the handle is maintained in position on the stem by means of lockscrews.

On non-return (stop check) and check type valves, a disc driver is bolted to the disc at the tapped holes in the top of the disc as illustrated in Figure 5 to facilitate rotation of the disc. The upper lap guide and spring arrangement are again used as previously described for lapping operations with the lap.

Lapping operation should be accomplished following the procedures as previously described. After completion of lapping, check for bearing as previously outlined. A full-round narrow bearing should be obtained to insure a tight seat.

Prior to assembly, all parts should be thoroughly cleaned. All residue from the lapping and bearing check operations must be removed from all parts including the body.

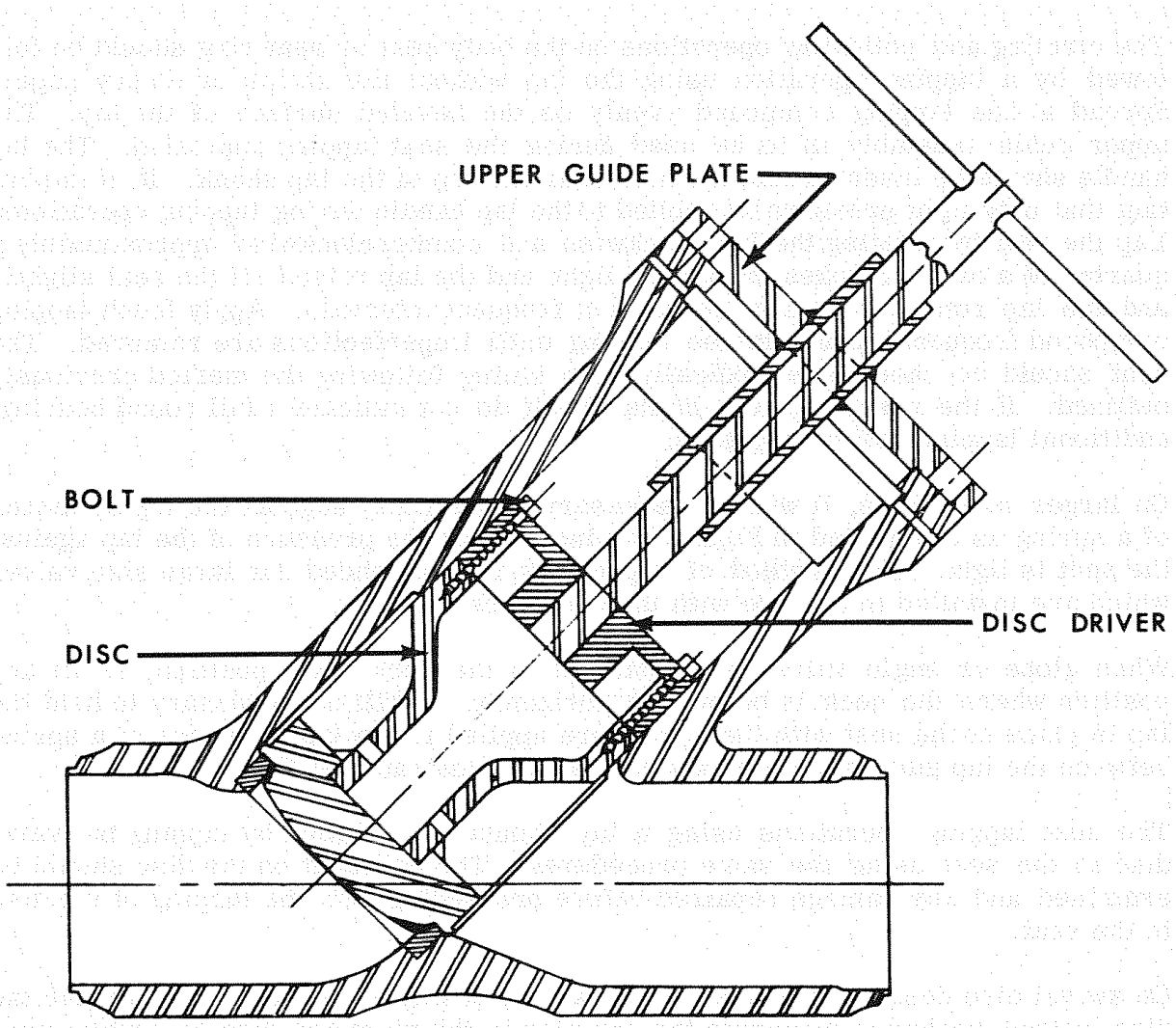
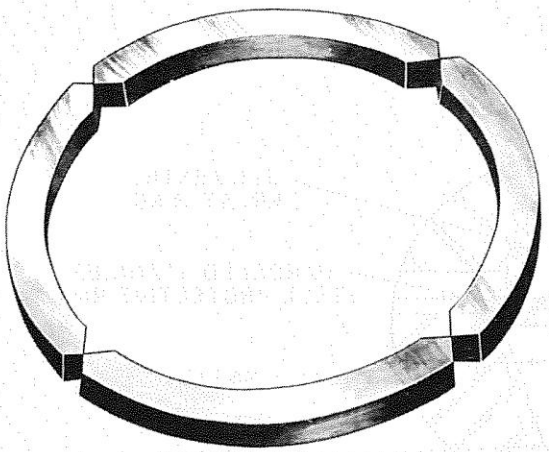
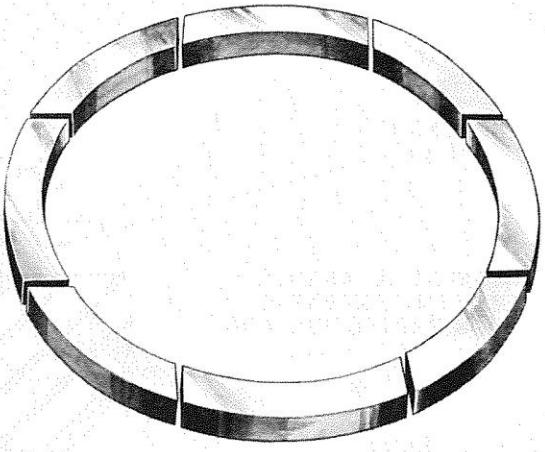


FIGURE 5

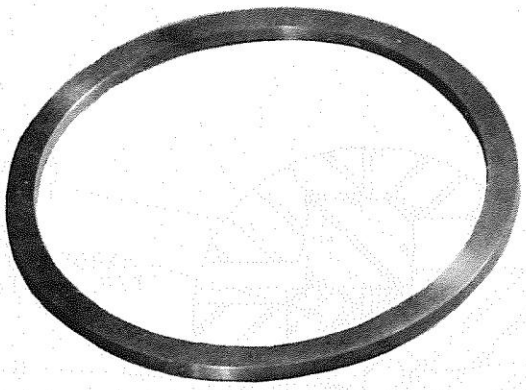
COMPONENT PARTS OF THE PRESURE SEAL JOINT



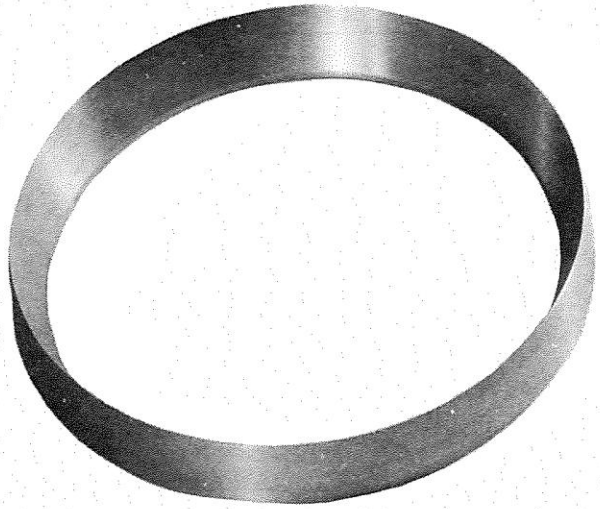
SEGMENTAL THRUST RING
(Four Segments)



SEGMENTAL THRUST RING
(Eight Segments)

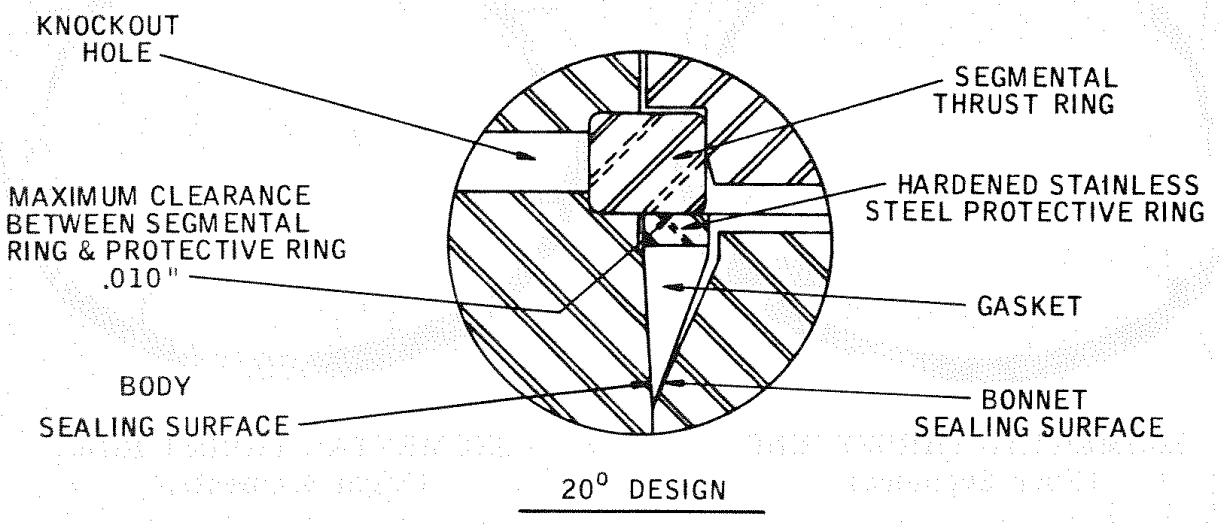


HARDENED STAINLESS
STEEL PROTECTIVE RING

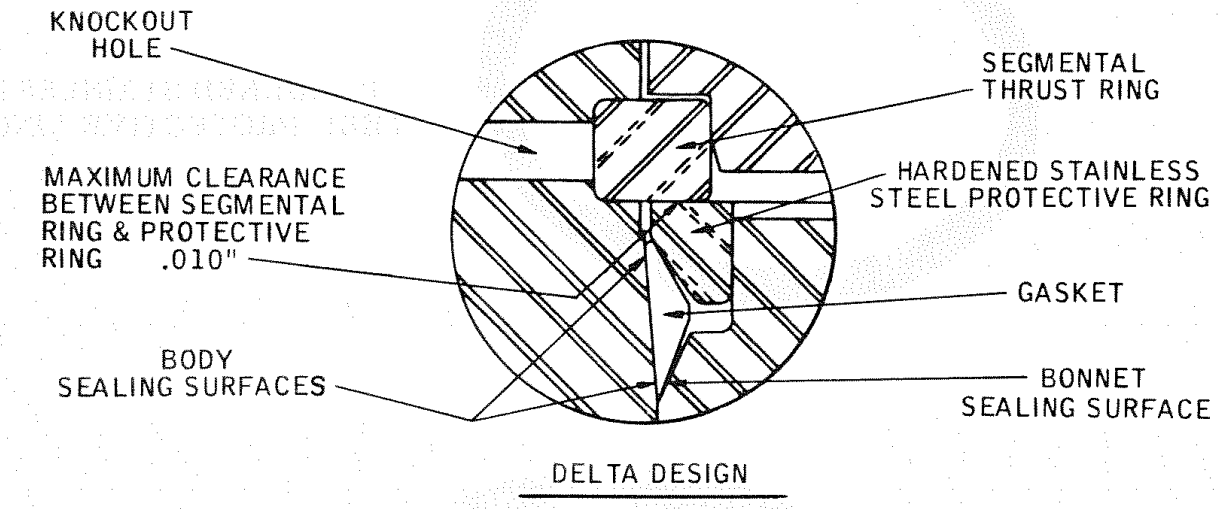


METAL GASKET

DETAIL OF THE POWELL PRESSURE SEAL JOINT



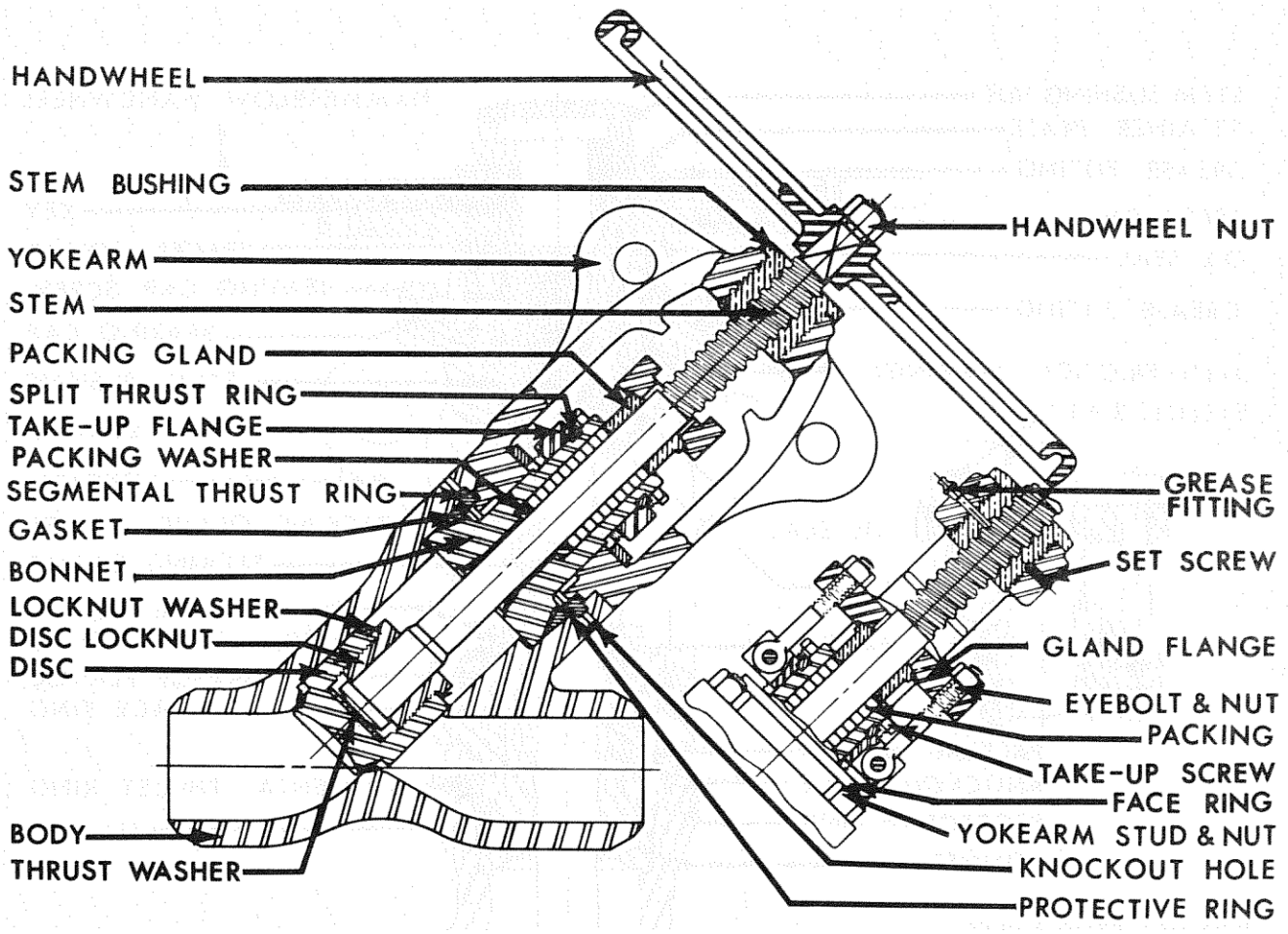
20^{o} DESIGN



DELTA DESIGN

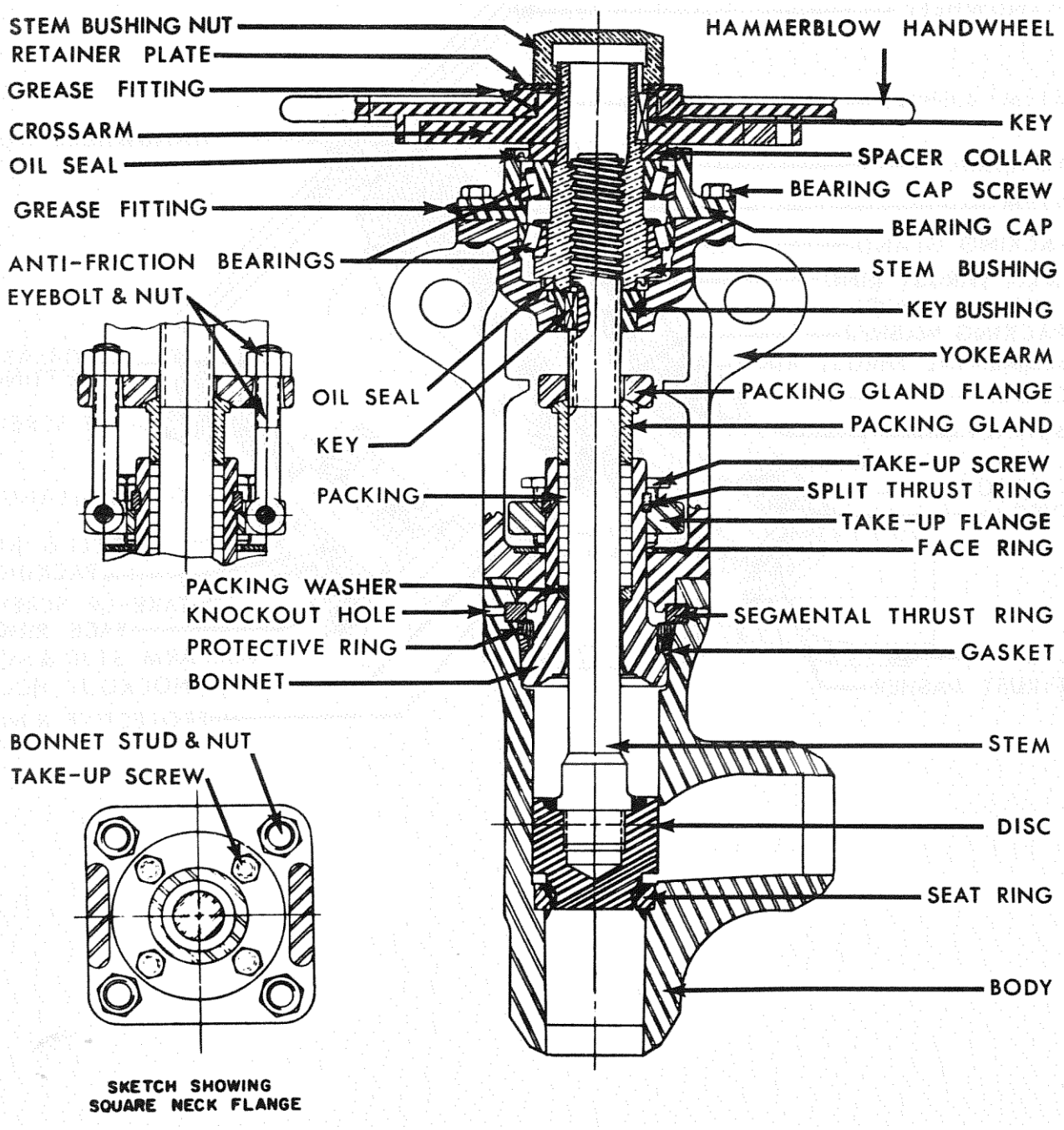
"Y" GLOBE VALVE

BONNET TAKE-UP SCREW DESIGN
(BOLTED YOKEARM STYLE)



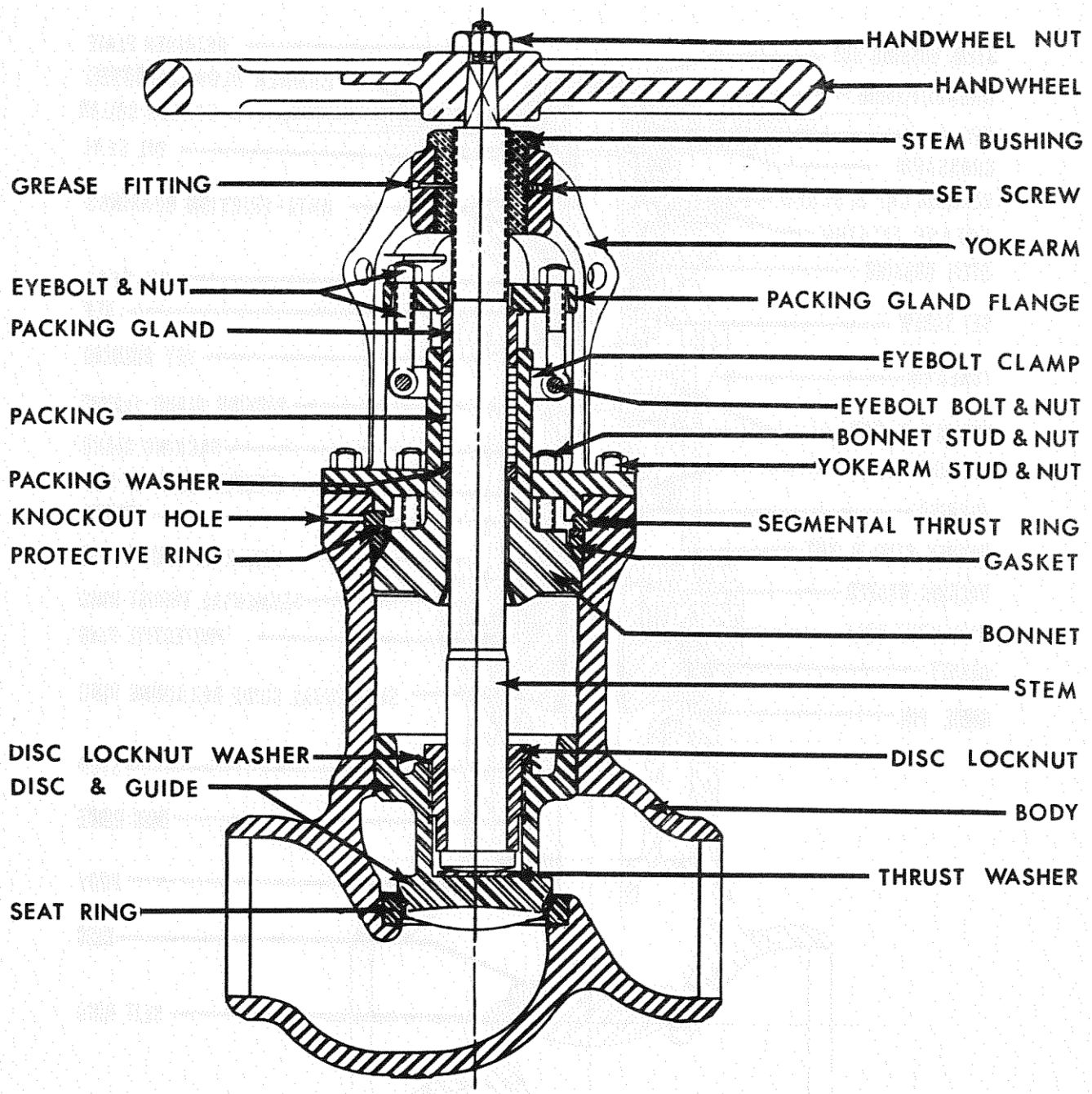
ANGLE VALVE

BONNET TAKE-UP SCREW DESIGN
(BOLTED YOKEARM STYLE)
DELTA SEAL GASKET



GLOBE VALVE

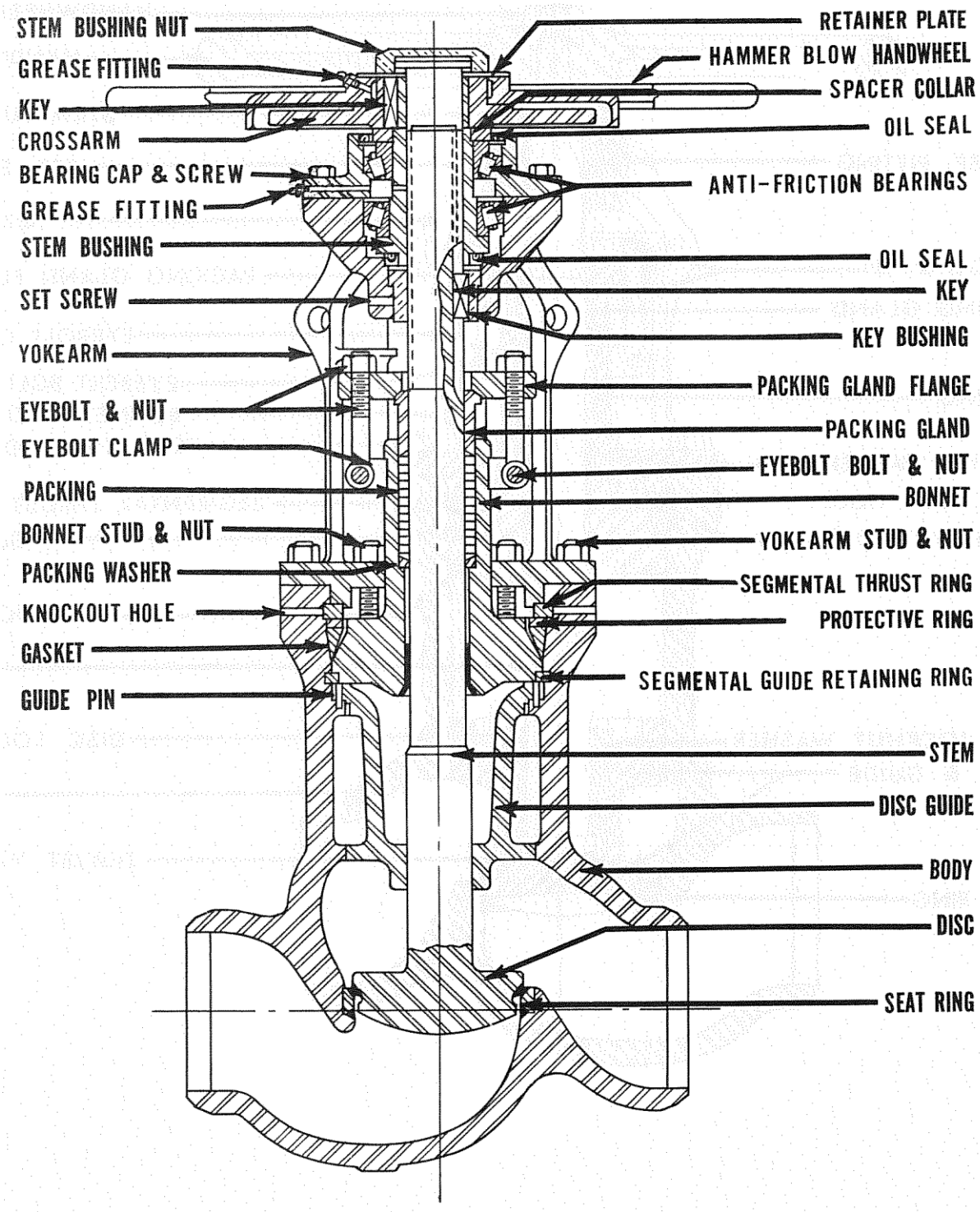
BONNET STUD DESIGN



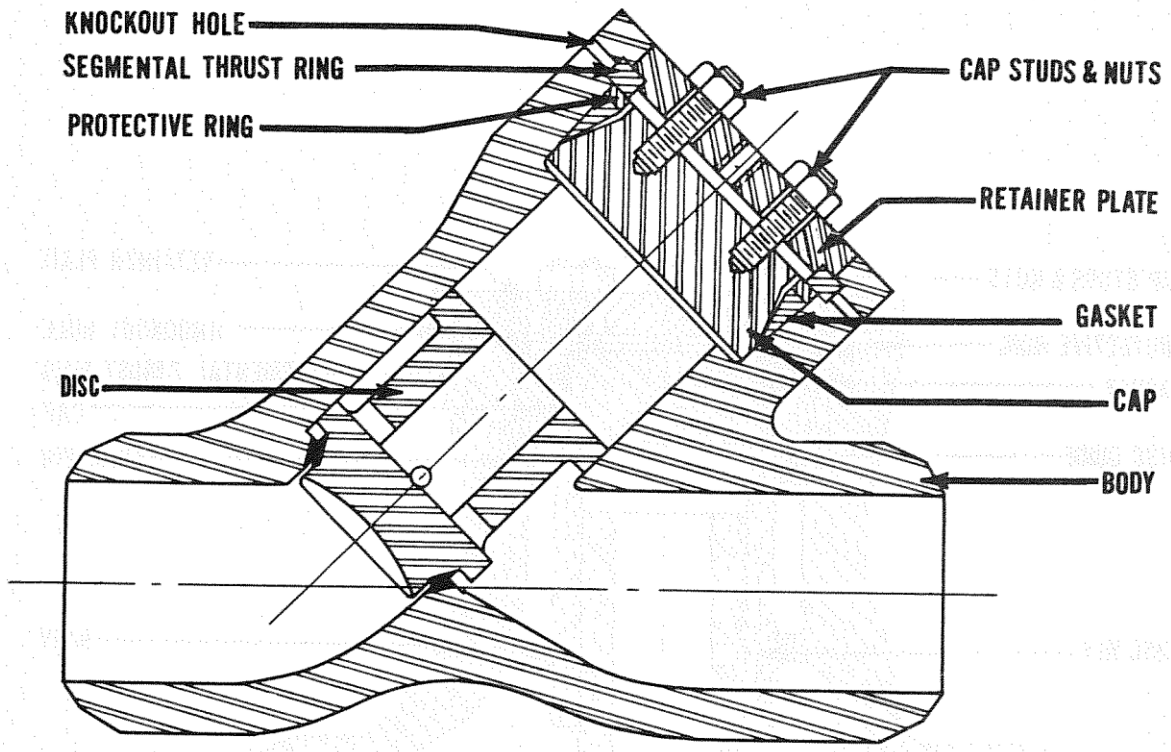
GLOBE VALVE

BONNET STUD DESIGN

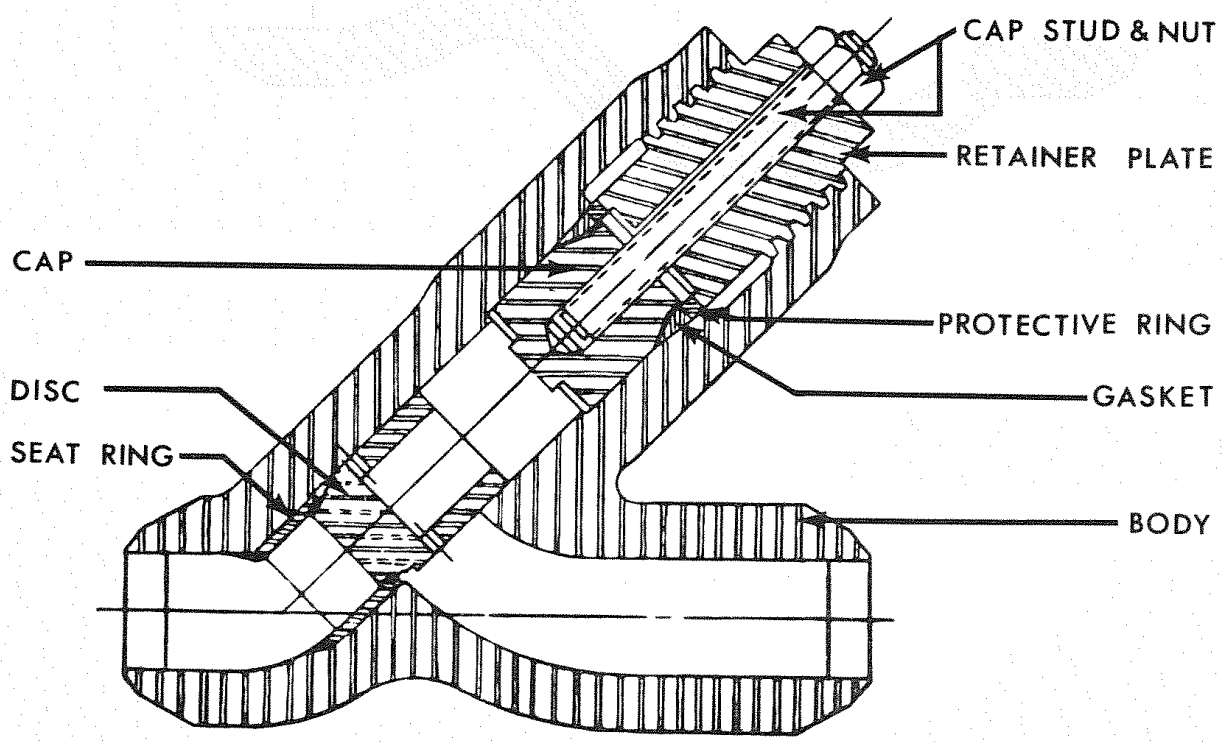
TYPE B – SEGMENTAL GUIDE RETAINING RING



"Y" CHECK VALVE

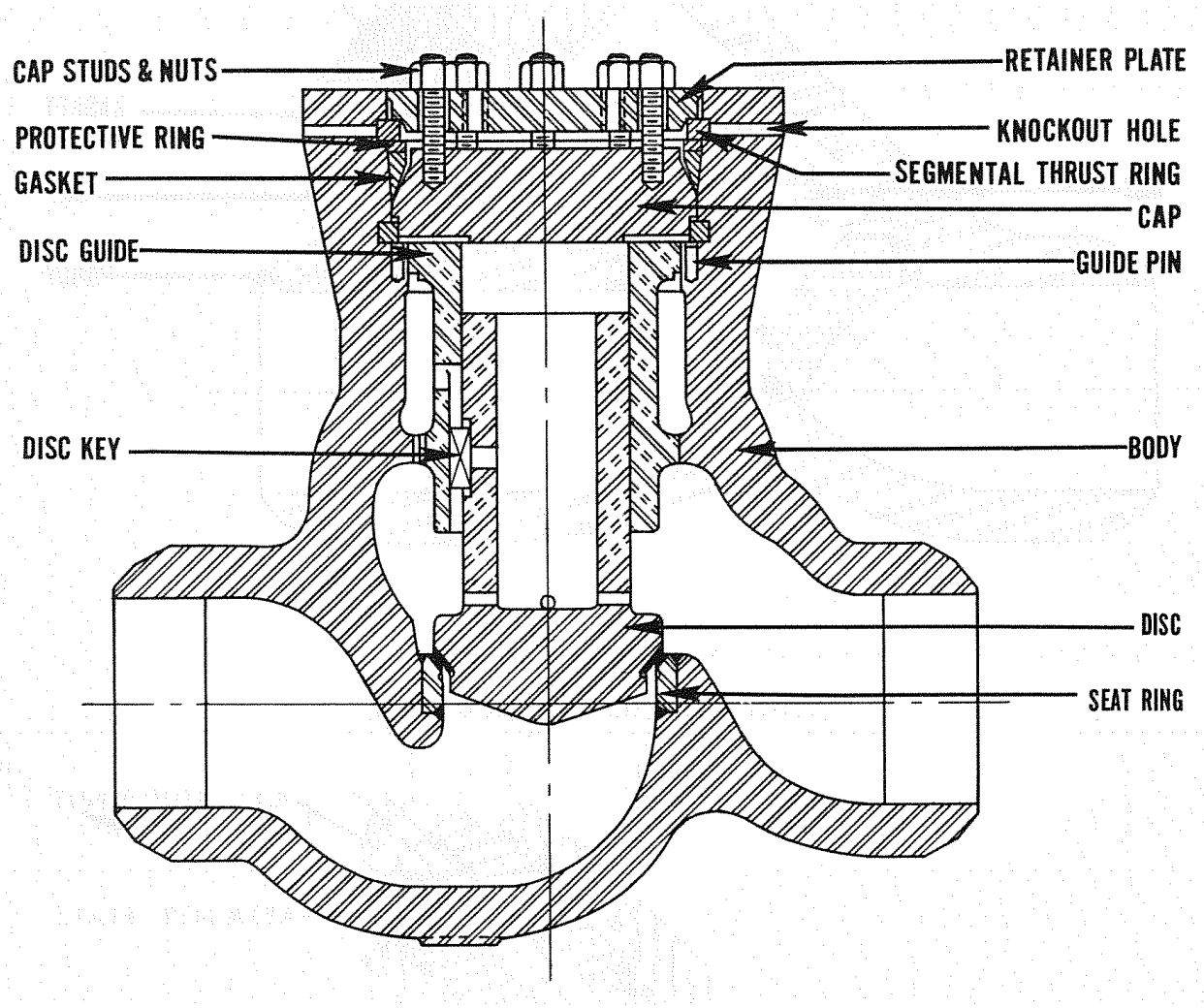


"Y" CHECK VALVE
(THREADED RETAINER STYLE)



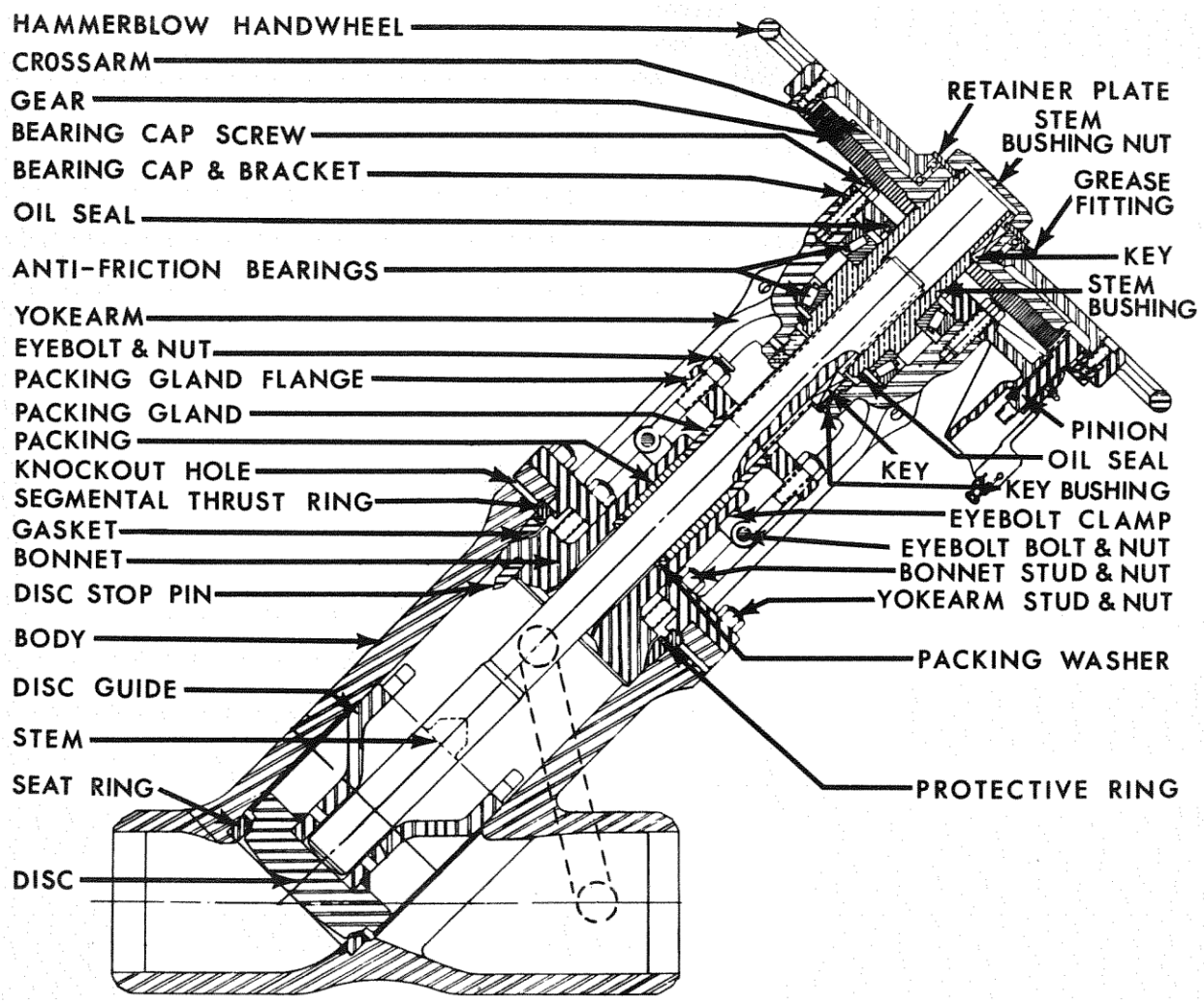
HORIZONTAL CHECK VALVE

TYPE B – SEGMENTAL GUIDE RETAINING RING



“Y” GLOBE NON-RETURN (STOP CHECK) VALVE

BONNET STUD DESIGN



NOTES

NOTES

PEOPLE WHO KNOW VALVES KNOW POWELL

Form 299 2-13